INTERNATIONAL ABSTRACTS OF SURGERY

VOLUME 85 SEPTEMBER, 1947 NUMBER 3

COLLECTIVE REVIEW

THE DEVELOPMENT OF THE CONCEPT OF ANTISEPSIS AND ASEPSIS FROM LISTER TO WORLD WAR II.

H. WINNETT ORR, M.D., F.A.C.S., Lincoln, Nebraska

MANY surgeons before Lister had observed the primary healing of wounds. Some of them had envisioned universal recovery from traumatic injuries and surgical operations if only the cause of local inflammation and the systemic "hospital fevers" could be found. But most prelisterian surgeons had become reconciled to pyemia, septicemia, and hospital gangrene as being inevitable, except in those patients who, by some providential dispensation over which the surgeon had no control, escaped.

Some thought the so-called hospital diseases were caused by "miasmas" in certain neighborhoods, by the polluted air in the vicinity of graveyards or where there had been much disease, as in hospitals. The outstanding surgeon, John Erichsen (one of Lister's teachers), advocated the tearing down or burning of hospitals in which erysipelas and gangrene were prevalent. He said it was as impossible to rid them of contagion as to stop the fermentation in a cheese.

The Lister antiseptic system did not spring all at once, fully developed from the mind of the inventor. Like most medical and surgical discoveries, the antiseptic system developed gradually, and not even always consistently, during the years both before and since Lister promulgated his idea in 1867. What Lister saw that others did not see was that chemicals might be employed to keep the germs that caused inflammation (putrefaction) out of injuries and surgical wounds. He did not at first employ a chemical in the ordinary wounds and sores that every doctor and every surgeon sees in his practice. In a course of lectures that he gave at the University in Glasgow, he referred to the fact that in private practice he was still using the water dressing. But he said that he used carbolic acid in the hospital not so much for the benefit of the sores themselves as for producing as much purity as possible in the hospital wards, to keep the causes of putrefaction out of wounds, and to limit putrefaction when present to the original victims.

In referring to this matter Lister indicated that he foresaw the time when with clean wounds it might be possible to sew them up and have them heal by primary intention, that is, without any wound complications, inflammation, or suppuration whatever. Lister set this idea aside, however, at that time for the reason that he could not imagine the use of any chemical to sterilize the wound or to make the wound sufficiently clean for primary closure without too much damage to the tissues. Lister had constantly before him the cases in which extensive suppuration, inflammation, and other hospital diseases (to which we have referred) were present. He realized that to sew up or close wounds might cause surgical complications and deaths, and that this danger could never be disregarded if suppuration, fermentation, and putrefaction had not been avoided at the beginning.

On the other hand, Lister feared the effects of antiseptics applied directly to the wound surface. He had not arrived at the point where he could foresee or understand the prevention of surgical infections by "aseptic methods," that is, the keeping out of germs by sterile dressings, rubber gloves,

CAESARIS
MAGATI
SCANDIANENSIS
IN ALMO FERRARIENSI GYMNASIO
Publici Medicinæ Professoris,
DE RARA MEDICATIONE VVLNERVM
Seu de Vulneribus rarò tractandis,
LIBRI DVO.
IN QVIBVS NOVA TRADITVR METHODVS,
quâ felicissimè, ac citius quam alio quouis modo sanantur Vulnera.
Quæcunque præterea ad veram, & perfectam eorum curationem attinent, diligenter excutiuntur: permultaq; explicantur Galeni, & Hippocratis loca eò spectantia.
HÆC AVTEM DVPLICI QVÆSTIONE
I. Vtrùm melius sit vulnera quotidie solvere, ac procurare, an pluribus intermissis diebus.
II. Vtrùm turundarum, & penicilluum vsus in Curatione vulnerum sit necessarius.
NOVVM ARGVMENTVM EST, A NVLLO HACTENVS attentatum, sed pulcherrimum, & Vulnera tractantibus maximè fructuosum.
Accessit huic editioni
IOANNIS BAPTISTÆ MAGATI
Tractatus, quo rara Vulnerum curatio defenditur contra Sennertum.
Cum triplici Indice Capitum, Quæstionum, & Rerum omnium memorabilium.
VENETIIS, Apud Io: Iacobum Hertz, M. DC. LXXVI
SVPERIORVM PERMISSV, ET PRIVILEGIO.

Fig. 1.

antiseptic preparation of the skin, covering of the surgeon's nose and mouth, and the like, for the better protection of the patient at the time of operation.

Lister explained, upon the occasion of one of these lectures (about 1870), that even in those days the surgeon did not undertake the removal of a tumor if he knew beforehand that he would be unable to close the wound and close the skin after the operation. Surgeons thought that any open wound was dangerous for the patient. Lister told of an experience in which he had excised a small epithelial cancer from an old lady's scalp; the edges of the wound could not be brought together. "Putrefaction" nearly caused her death but by good fortune she recovered.

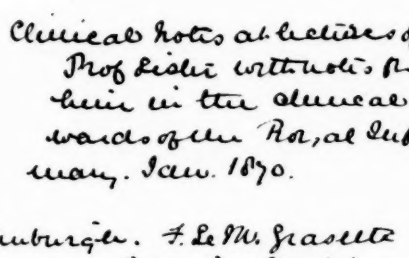
He said: "I determined from that very time to use antiseptic dressings to every raw surface." This indicated that, even then, he considered irritation of the wound surface by carbolic acid preferable to risking the danger of infection after operation. He did not appreciate fully the dangers of secondary infection at the time of changing dressings, and the fact that such infections did occur (then as now) had not made its full impression upon him.

Regarding his view of the future and the possibility of performing aseptic operations, his exact words were as follows: "But then you might say theoretically that if you have some germ poisoner which will prevent decomposition and at the same time which would not irritate the surrounding tissues, we might sew up the edges of the wound closely together. Do we know of any material which would kill the germs without irritating the tissues? If we had such a substance we might then sew up the wound and apply some antiseptic dressing and reckon upon union by the first intention. That is theoretically the correct treatment of incised wounds. Have we any such antiseptic? No!" That was Lister's answer in 1870, and it is my answer now.

Regarding compound fractures, Lister said, "Fifteen cases of compound fracture were treated by my last house surgeon, Dr. (Sir Hector) Cameron, and all of these men or women are living with all their limbs on." And in another place he said that it was worse than useless to syringe out a compound fracture with carbolic acid and not apply an antiseptic dressing. "The effect of the acid would pass away in a few hours and the parts would be exposed to a worse irritation than if they had never been syringed with the antiseptic. Amputation at first would have been better."

This was the Listerian teaching. It was perfectly clear, perfectly comprehensible, and perfectly true, but it has not been understood or followed entirely by many of those who have undertaken the primary or the secondary closure of infected wounds. Those successes which have occurred following primary closure have not been attributed, as they should have been, to the resistance and powers of recovery in the patient, but to the agent employed, whatever that chemical happened to be.

Mr. Sampson Gamgee, a Lister contemporary in London, was one of those who protested against the adoption of the antiseptic method. He said that one may as properly speak of homeopathic medicine as of antiseptic or any other special kind of surgery. Gamgee was a well trained surgeon who had visited other countries and knew their methods. He had seen Maisonneuve at the Hotel Dieu in Paris using "antiputrescent lotion" of 1 per cent carbolic acid to control wound infection. Declat said that Maisonneuve had used this since 1861 (6 years before Lister) constantly for wounds after an original demonstration by Declat himself. Gamgee was an advocate of the infrequent com-

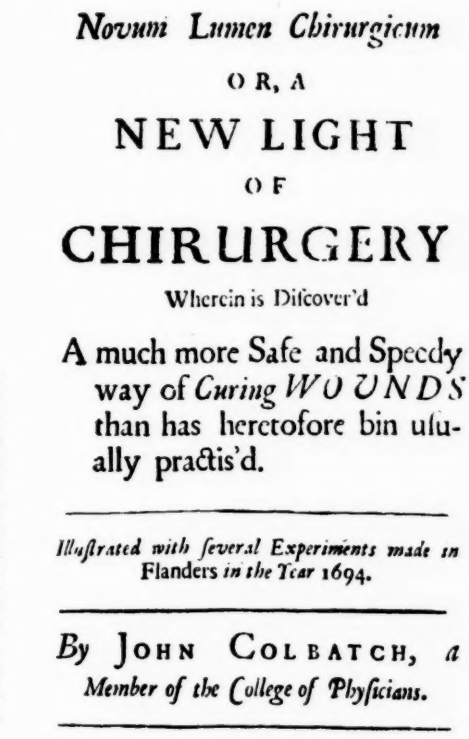

Clinical Notes of Lectures of Prof Lister with Notes of them in the Clinical wards of the Royal Infirmary. Jan. 1870.

Edinburgh. F. Le M. Grasett Session 1870/71.

Fig. 2.

pression dressing to which he had already given the name of "hyponarthesis." Gamgee reported a series of more than 100 general surgical cases treated without using Lister's method and with less than 3 per cent mortality. He referred to the simple methods of operation and dressing by Baron Larrey who did 14 shoulder amputations on the battle field with only 2 deaths. This was to call attention to the fact that such methods as compression or wound protection, drainage, and rest gave patients an opportunity to recover before the days of antisepsis. At the same time it must be remembered that in Lister's own wards at Glasgow, before antiseptic methods were employed and when irrigations, frequent dressings, and sepsis were general, the death rate in all amputations, even fingers, was from 50 to 75 per cent.

It was very easy for Gamgee to adjust and adapt the wound dressing method with which he was already familiar, and which he had been teaching, to the germ theory of wound infection and putrefaction. This is indicated as well as anywhere in Gamgee's "Treatment of Wounds and Fractures," which appeared in London in 1883. In an article published in Heath's Dictionary of Surgery, Vol. 2, p. 813 (Philadelphia ed., 1886), he amplified and clarified his views somewhat further, to indicate exactly where he stood on the Lister antiseptic method. Gamgee wrote, "Antiseptics have, so far, only been mentioned incidentally; but the materials recommended for the wound-dressings, such as borax and glycerine, tincture of benzoin, styptic colloid, and collodion, are in eminent degree antiseptic. The question in wound-treatment is not one of antiseptics or no antiseptics, but of the form and proportion in which they should be employed in particular conditions. The great antiseptic is life. The living tissues have a natural preservative power, which, if guarded and conserved by the surgeon on physiological principles, offers the surest guarantee for healthy repair, which


Novum Lumen Chirurgicum

OR, A

NEW LIGHT

OF

CHIRURGERY

Wherein is Discover'd

A much more Safe and Speedy way of *Curing WOUNDS* than has heretofore bin usually practis'd.

Illustrated with several Experiments made in Flanders *in the Year* 1694.

By JOHN COLBATCH, *a Member of the College of Physicians.*

LONDON,
Printed for *Dan. Brown*, 1704.

Fig. 3.

is only an adaptation and extension of normal nutrition."

With the great improvement in results that took place in surgical practice generally after the antiseptic system became popular, it is not astonishing that other useful surgical expedients came to be neglected. One felt that with infection under control, results were so much better that they were good enough. Also, surgeons, as doctors often do, fell into the error of supposing that every improvement in the patient's condition following the use of the antiseptic was due to the chemical agent employed. They forgot, as Gamgee and others had pointed out, that

"Life and putrefaction are not correlative, but antagonistic; and in proportion as the surgeon utilises and economises the attributes of life, he will find himself independent of those changes which are inherent to decaying organic matter; whether

THE
Manner of Curing all
FRACTURES
AND
DISLOCATIONS,
Incident to
Humane BODIES,
By the Means of
BANDAGES.

Compiled by M. *Lawrence Verduc*,
Sworn Master Surgeon at *Paris*.

LONDON;
Printed for *S.* and *J. Sprint*, *J. Nicholson*, in *Little-Britain*; and *A. Bell* and *R. Smith* in *Cornhill*. 1706.

Fig. 4.

it be in bagging wounds or boggy lands." (42-2 ed., pp. 285-286).

Lister began the antiseptic treatment of wounds with carbolic acid. Some of his early results were as good as any he or his successors ever attained. A point to which it seems important to call attention in this article is that Lister's later laboratory experiments with germ cultures, fermentation, and antiseptic chemicals had a confusing and distracting effect even upon him in his further application of the "antiseptic principle" of wound protection, which was his original idea.

To convey an impression of surgery prior to the introduction of the antiseptic method is almost impossible. It is important, however, to know something of what was happening in practice and in hospitals if we are to appreciate the great change that occurred. Some of our popular histories as well as many heavy surgical volumes convey the sad story of those times. Ralph Major's "Fatal Partners—War and Disease" gives us an idea as to what the infectious diseases were doing before we understood the relationship between germs and the epidemics of communicable disease.

In a way the surgery of the prelisterian era was a plague in itself. There were thousands of post-operative deaths from gangrene, erysipelas, tetanus, and gas bacillus infections. Surgery, directly responsible for most of these, was revolutionized, just as was the control of tuberculosis, typhoid fever, and cholera, by Pasteur, Lister, and Koch.

One of Lister's biographers, Cuthbert Duke, pointed out that when a surgeon in those days had performed successfully the simplest operation, such as the amputation of a finger, he knew it might be followed by dangerous and even fatal consequences. Professor Volkmann at Halle made the remark that, before Lister, when a surgeon closed the wound, he was "like a husbandman, having sown his field waits with resignation for what the harvest may bring and reaps it fully conscious of his own impotence against the elemental powers which may pour down upon him rain, hurricane, and storm."

One of the earliest effects of the introduction of the antiseptic system was to call attention to the fact that while deaths caused by sepsis and infection were common following operations in private homes, the results were far worse when patients were operated upon in hospitals. We know now that infection was carried from one patient to another and that tetanus, erysipelas, gangrene, and septicemia were communicated by the patients or their attendants. Intramural epidemics of these septic diseases became so serious that the tearing down of buildings and their replacement were urged as the only method to get rid of the infectious plagues.

In 1861 the death rate after amputations in all the Paris hospitals was as high as 3 deaths among every 5 operations. Although he was one of the severest critics of the antiseptic method, Sir James Simpson, speaking on the same program with Lister at Belfast in 1867, asked the public health section of the National Association for the Promotion of Social Sciences the following question: "To what extent are hospitals as in general at present constituted banes or blessings, and how can they be so changed as to convert them from the former to the latter?" He suggested that "stone and marble palaces" should be abandoned and that iron or wooden villages should be built in their place. He thought that in this way the new buildings would be free from the polluted air which he supposed caused the infections and surgical diseases to which all such hospitals were subject at that time.

Even as late as 1874 Sir John Erichsen suggested that hospitals should be torn down and rebuilt periodically. He said, "Once a hospital has become incurably pyaemia stricken, it is as impossible to disinfect it by any known means as it would be to disinfect the crumbling wall of the ants that have taken possession of it, or an old cheese of the maggots that have been generated in it."[1]

It is for these reasons that Lister chose "The Effect of the Antiseptic System upon the Salubrity of Hospitals and Hospital Wards" as the title for one of his early papers.

In 1853, when Lister arrived at the University of Edinburgh to begin his graduate study of surgery with Professor James Syme, Syme was at the height of his professional career. His reputation for surgical skill, as a teacher, and for exceptional personal qualities had extended not only throughout the British Isles, but into Continental Europe and America as well.

In surgery, as in other ways, Syme was a militant crusader. He could be and often was a genial host to friends in his home, but in public and in professional matters he was a constant fighter for the principles and methods which rested upon his fine training and his experience, and he was against all tendencies or teachings which he considered to be less worthy of consideration.

Lister had been sent to Edinburgh with a letter from William Sharpey, a great friend of Professor Syme. As a student, Sharpey had studied at both Edinburgh and Paris and it was in Paris that he formed a lifelong friendship with Professor Syme.

Lister's first paper at University College, London, written under Sharpey's supervision, was one on the conduct of the iris of the eye and the physiology of vision. It is now interesting to remember that in this paper Lister commented upon the fact that the methods employed had served to delay the decomposition of the tissues upon which he was engaged.

When Lister became house surgeon to John Eric Erichsen in London (1852) he had charge of his first patients. Erichsen had written, and continued to write, some of the best literature in the entire history and development of surgery. One of his special anxieties was with regard to hospital gangrene, wound infection, and blood poisoning after injuries and operations.

It was generally believed by surgeons that putrefaction and gangrene were occasioned by the access of the oxygen in the atmosphere to the wound. Lister made it his special study to observe and compile data upon surgical complications as they occurred and to note conditions or materials that seemed to affect the course of the various kinds of inflammation and surgical disease.

The circumstances under which Lister saw his first surgical operations thus accounted in considerable measure for his interest in the causes and effects of inflammation. The use of ether and chloroform was just becoming general and patients consented to have operations performed because they could be done without pain and without some, at least, of the risks to which they had been accustomed. Surgeons themselves were much more courageous in undertaking operative procedures, about

[1]This reverts to the view formerly held that maggots and other small animals originated *de novo* in decomposing or putrefying organic matter. Not only Pasteur with his "germ theory" and his demonstrations as to the continuity of life in bacterial cultures, but Koch with his "rules" and other scientific workers, spent years in proving that all living things have living parents.

A SERIES

OF

AMERICAN CLINICAL LECTURES

EDITED BY

E. C. SEGUIN, M.D.

VOLUME III. No. XI.

[WHOLE No. 35.]

TWO LECTURES ON LISTER'S ANTISEPTIC METHOD OF TREATING SURGICAL INJURIES

BY

JAMES L. LITTLE, M.D.

PROFESSOR OF SURGERY IN THE MEDICAL DEPARTMENT OF THE UNIVERSITY OF VERMONT; SURGEON-IN-CHIEF TO THE MARY FLETCHER HOSPITAL, BURLINGTON, VERMONT; SURGEON TO ST. LUKE'S AND ST. VINCENT'S HOSPITALS, NEW YORK; LECTURER ON OPERATIVE SURGERY AND SURGICAL DRESSINGS IN THE COLLEGE OF PHYSICIANS AND SURGEONS, NEW YORK

NEW YORK
G. P. PUTNAM'S SONS
182 FIFTH AVENUE
1878

Fig. 5. Dr. Seguin was Dr. Ridlon's preceptor in New York before 1890.

A REPORT

ON

HOSPITAL GANGRENE,

ERYSIPELAS AND PYÆMIA,

AS OBSERVED IN THE

DEPARTMENTS OF THE OHIO AND THE CUMBERLAND.

WITH CASES APPENDED.

BY M. GOLDSMITH.
Surgeon U. S. V.

PUBLISHED BY PERMISSION OF THE SURGEON GENERAL U. S. A.

LOUISVILLE:
BRADLEY & GILBERT, CORNER OF THIRD AND GREEN STREETS.
1863

Fig. 6.

the dangers of which otherwise the patients knew very little.

Lister saw these operations at University College Hospital in London. While many of them were performed with considerable dexterity on the part of the surgeons, there were still the surgical complications which always prevailed in every hospital after injury or operation.

It does seem strange that Lister, alone of those who witnessed the after effects of operations and the surgical diseases of that period, should have arrived at an understanding of these surgical complications. As it was, he had studied the problem sufficiently so that the discovery of germs gave him, first, the cue to the use of antiseptics for the prevention of the "hospital diseases."

As Sir Clifford Allbutt said, "Lister was sitting on the heights and watching there alone" for Pasteur's discovery.

From the point of view of the "exclusion of the causes of putrefaction," Lister's exposition even as reported by Godlee should, if it had been understood by surgeons generally, have saved much of the confusion and many of the erroneous practices (including the Carrel-Dakin method) of the last 70 years. Godlee said: "With carbolic acid as the antiseptic he (Lister) introduced what he called a 'protective.' This was a material (mackintosh) unstimulating in itself and impervious to carbolic acid. The intention was to place a piece of the protective, of limited size, in immediate contact with the wound, in order to protect it from the irritation of the dressing which, however, overlapped the protective widely on every side."

Lister was using the protective in 1869 but he first described it in 1870 in a clinical lecture at Edinburgh, in which he thus explained its meaning and purpose: "Of all those who use antiseptics in surgery, I expect that I apply them least to the surface of the wound. After the first dressing, the object which I always aim at is to have the material in contact with the exposed tissues approximate as closely as possible to the perfectly bland and neutral character of the healthy living textures. If you consider the circumstances of a simple fracture, which you cannot too often call to mind if you wish to keep your ideas clear and right upon this subject—if you remember how the severe contused internal wound, with the interstices of the mangled tissues loaded with extravasated blood, recovers quickly and surely under the protection of the unbroken integument, it is plain that all that is required in an external wound is to guard it against the disturbing influence of (any) external agency. The injured tissues do not need to be 'stimulated' or treated with any mysterious 'specific'; all that they need is to be let alone.

"Our 'protective,' then, should be a material unstimulating in its own substance, and impervious to carbolic acid. At the same time it must be insoluble in the discharges, and sufficiently supple to apply itself readily to the part.

"These principles[1] will be found to apply whatever be the materials used for carrying out the antiseptic system. An antiseptic to exclude putrefaction, with a protective to exclude the antiseptic will, by their joint action, keep the wound from abnormal stimulus" (51—2 ed. pp. 216-217).

Perhaps further clarification of Lister's original ideal is unnecessary, but here is a statement from the long time associate who was the "Boswell" of his entire professional career (25—Pp. 10-11).[1]

"Lister's application of Pasteur's statements was:

[1]Protection of the tissues and exclusion of infection—*not* details of technique. (H.W.O.).

"(1) That these germs must be prevented from getting into wounds during and after operations, and that they must be killed if possible outside the wound.

"(2) That if they have succeeded in getting into a wound before the case is seen by the surgeon, as in compound fracture, they must be killed if possible before they have had time to spread and secure a footing and further germs must then be prevented from entering the wound afterwards.

"These principles still hold the field whatever methods are employed to carry them out, and they are not likely to be given up till some means have been devised for protecting the body against all germs which may enter it, and this is certainly not within sight at the present time." (25—Pp. 50-51). (New chemical techniques have usually contributed complications, false confidence, and confusion. H.W.O.)

"Lister's first operation was the opening of a psoas abscess, and it is interesting to note how he did it. (1) He first prepared a mixture of one part of carbolic acid to three parts of boiled linseed oil. A piece of lint about six inches square was soaked in this solution and placed over the site of operation for some time before it was performed; the instruments were also placed in carbolic oil, and naturally the surgeon's and assistants' fingers became coated with it. When everything was ready the piece of lint was raised at one side and an incision was quickly made into the abscess; the lint was then allowed to fall back over the wound and the pus was squeezed out of the abscess under cover of the oiled lint, and finally a strip of the oiled lint was pushed through the opening into the abscess in order to keep the wound from closing.

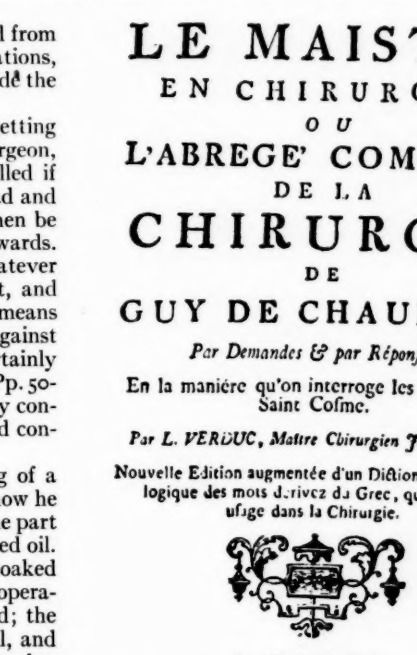
"(1) I cannot find the exact date of this operation, but I think that it was early in 1867."

Several of Lister's biographers have pointed out that Lister endeavored from the beginning to employ chemicals for the purpose of excluding germs from wounds, and this is true. The use of carbolic acid to exclude infection was the fundamental conception with which Lister inaugurated his antiseptic system. He was so emphatic on this piont that when Von Bergman and his followers began to advocate the aseptic method, it was supposed by many that there had to be two schools of surgery: one, the antiseptic, in which chemicals were used entirely, and the other, the aseptic, in which nonantiseptic solutions for washing germs away and boiling and heat with sterilized dressings were employed as the technical agents.

One may suppose that this situation was partly responsible for Lister's further studies of germicides and germicidal dressings, while some who held themselves out to be really opponents of the Lister method made their campaign on the side of the asepticists. It is easy now for us to see that these two schools had much in common, but the antisepticists are still responsible as they were in Lister's time for a misunderstanding of the proposition that to protect a patient against infection and especially against mixed infection is one of the greatest services that a surgeon can render in or out of the operating room.

That Lister did become confused, by both friends and enemies, is indicated by his reaction to the early German demand "Fort mit dem Spray," and by the fact that both British and American visitors saw the tendency away from his original ideal and toward attempts to cure wound infection by new and different changes in technique. The following was from a Philadelphia surgeon:

"Most of Lister's contemporaries did not recognize the fact that he was contending for a principle in surgery; they looked upon his innovations as nothing more than the introduction of some new



LE MAISTRE
EN CHIRURGIE,
OU
L'ABREGE' COMPLET
DE LA
CHIRURGIE
DE
GUY DE CHAULIAC,
Par Demandes & par Réponſes,
En la maniére qu'on interroge les Aſpirans à Saint Coſme.
Par L. VERDUC, Maître Chirurgien Juré à Paris.
Nouvelle Edition augmentée d'un Dictionnaire Etymologique des mots dérivez du Grec, qui ſont en uſage dans la Chirurgie.

A PARIS,
De l'Imprimerie de la Veuve d'HOURY, ruë de la Harpe, au Saint Eſprit.

M. DCC. XL.
Avec Aprobation & Privilége du Roy.

Fig. 7.

form of wound dressing. The 'simple dressing' employed by my father, (John Ashhurst, 2—Pp. 16-17 and 22-23) than whom no one secured better wound healing in these preantiseptic days, consisted in lint saturated and kept moist with pure laudanum, the use of which he had learned from 'that excellent surgeon, Dr. Joseph Pancoast;' after forty-eight hours diluted alcohol was substituted and continued until the wound was nearly healed.

"Their objections to Lister's methods were, above all, that they were always being changed: first it was carbolic acid; then carbolized oil; then the carbolic putty; then watery solutions; then a carbolized cerate plaster; then a 'lac plaster;' then oil of eucalyptus: Was there to be no end of innovations?"

This uncertainty about technical methods in surgical practice has been disturbing ever since. Anxiety about the chemical to be used, the spray, material for sutures, dressings and drainage tubes caused surgeons to forget all about "exclusion" of infection, the protection of the wound surface, and the patient.

As one of his house surgeons said, "In those days Lister was so sadly misunderstood that the idea became prevalent that he considered carbolic acid possessed a mystical charm over wounds. Only bring carbolic acid upon the scene, and pyaemia and septicaemia would vanish! One day he read to us a letter he had received from a surgeon expressing his disappointment that although carbolic lotion had been sprinkled upon the wound, and basins of it had been placed around the bed, and some had even been sprinkled upon the floor, yet the patient died!"

Among the controversies that raged about the introduction of the Lister antiseptic method, none was more serious or prolonged than that with reference to the use of the carbolic acid spray. Lister himself believed at first implicitly in the importance of this attempt to sterilize the atmosphere. He thought that carbolic acid in the air was just as important as the cleansing of the surgeon's hands or the carbolizing of the dressings by which he hoped to exclude all infection from the wound area.

It is easy as we look back to understand Lister's point of view. Pasteur had performed various experiments with culture fluids in open and closed flasks and flasks with cotton and other kinds of filters to keep out germs. All of these experiments indicated many living organisms constantly present in the atmosphere. Lister felt that any wound surface exposed to an atmosphere so alive with living matter must therefore always be exposed to the dangers of the putrefaction, fermentation, and infection about which he had been so much concerned.

It was only after a number of years and after becoming convinced of the greater importance in surgery of clean hands and dressings and sterilized instruments that he decided to abandon the spray. The pressure of many colleagues had a good deal to do with this change of mind, but Lister said he was ashamed to have advocated a method which was injurious to the patient, injurious to the operators, and both inefficient and unimportant in protecting the patient against infection.

Since Lister's time it has been shown again that the factors of greatest importance in causing infections in operative wounds or in wounds that are being dressed are the fingers and hands, the dressings and instruments which the surgeon handles, the surgeon's nose and throat, or the poorly prepared skin of the patient himself. These are the sources of most of the primary as well as most of the postoperative mixed infections in these cases.

Even so, there occasionally still appear articles about the sterilization of the air by means of chemicals or light or electricity, all very spectacular and dramatic but relatively unimportant in the conduct of surgical operations and operating amphitheaters.

A common criticism of Lister's method in the early years and one of the reasons for delay in its acceptance was that Lister declined to collect and tabulate statistical evidence in support of his teachings. As an actual fact, this would not have been difficult to do. Lister himself, however, was impatient with the statistical method. He realized, as many other surgeons have had to do, that clinical statistics may be accumulated and printed to prove almost anything. Elaborate reports, including statistics with regard to patients, have been manufactured to support theories or points of view without too much care as to their accuracy or even their truth.

As time went by, however, and after Lister came to Kings' College in London in 1877, some of his own assistants, as well as workers in certain other hospitals, collected and published sufficient material to more than justify the claims that had been made for the antiseptic method.

In 1876, William H. Welch and Frederick S. Dennis finished their services in Bellevue Hospital and went to Great Britain and Europe, for postgraduate study. Dennis later became a foremost New York and American surgeon with the somewhat unusual advantage of having always been a first class laboratory man besides. Welch, as everyone knows, was the leading laboratory bacteriolo-

gist and pathologist of his day, but for a laboratory man he had an extraordinary appreciation of the clinical side of his work. The combination of these two in European study was an incident of the greatest importance, especially as they spent some time on Lister and his work. When they returned to America they brought back cultures from the Lister laboratory, which, as Dennis said, satisfied him for the first time that there was a germ cause of disease and wound infection. Dennis persuaded Mr. Andrew Carnegie to build and equip a laboratory not only for this study but for instruction at Bellevue, and this was the first of its kind in this country.

Upon the occasion of the visit of Dennis and Welch to Guys Hospital in London, they found the great change that had already taken place in the percentage of deaths after compound fractures and wound infection. The reduction in some classes of operations and infected injuries was from 65 per cent down to an actual zero. Dennis confessed that for his own part he remained skeptical of the germ theory of inflammation until the Carnegie laboratory gave him the opportunity to work out the problem for himself. He concluded his report, as follows:

"The reduction of the death rate from 68 per cent, which half a century ago was considered a brilliant achievement, and a result which was thought worthy of publication, to that of a cipher, represents what surgery has done for the amelioration of human suffering and the preservation of life. Humanity, indeed, owes a debt of gratitude to the science of surgery, which has annihilated pain and suffering, and has preserved and prolonged human life. For this great work—to the former (Pasteur) as the discoverer of the means, and to the latter (Lister) as the one who applied the discovery to surgery the profession are indebted. Surely their names must ever be associated with the march and progress of the grandest profession in the world." (33—Vol. 1, pp. 422-423).

The drift away from the Lister ideal was indicated by many incidents such as the following:

In 1886 after stating clearly the conception of "exclusion,"[1] Watson Cheyne diverts at once to some of the antiseptic techniques that were and have continued to be violations of the original Lister idea.

He said, "In the Listerian Method the object is to prevent the entrance of living organisms into the wound."

(If there were putrefactive or septic complications in the wound, the above [as so often since]

[1]Heath, Dictionary of Practical Surgery. I and II in one volume. Philadelphia: J. B. Lippincott Co., 1886.

7] LISTER'S ANTISEPTIC METHOD. 297

1 to 40 solution is also used for the instruments and sponges during the operation

I dwell on this point, as there is some difference of opinion as to the use of these two solutions. In order to settle this, I wrote to Mr. Lister and received the following reply:

12 Park Cresent, Portland Place, 11th Dec., 1877.

My Dear Sir:—In reply to your inquiry in your letter of Nov. 26th, received yesterday, I write to say that I use the 1 to 20 carbolic acid lotion for purifying the skin of a part about to be operated on, and also my own hands before I begin to operate, and for cleansing instruments and sponges, and also for the spray, when a steam spray producer is employed. The 1 to 40 lotion is our ordinary lotion used for the sponges during the course of an operation, (the sponges having been purified before the commencement of the operation with 1 to 20) and for washing the wound when requisite, and for the lotion in changing dressings The 1 to 20, I should add, is used for washing (in order to purify them) wounds inflicted accidentally, such as compound fractures.

Thanking you for your kind report of the progress which antiseptic surgery is making in America.

I remain, yours very truly,

Joseph Lister

A very important feature of this method, is the use of the spray. This is used for the purpose of destroying the septic germs in the air before they reach the wound So we have to perform our operations and apply our dressings in a cloud of spray formed from a 1 to 20 solution of the acid The apparatus we generally use is a steam atomizer.

A good spray producer should break up the fluid into a fine cloud, the finer the better, as coarse spray soon wets the operator's clothing and condenses rapidly upon the bed, and the hands and clothes of the surgeon. The apparatus should be large enough to work for from one and a half to two hours at a time It should be so arranged that it can be placed and maintained at any level that may be desired, and should

Fig. 8.

seems to have been forgotten in Sir Watson's further instructions).

"Disturbance is easily remedied by proper application of a drainage tube. . . . Inflammation of the edges of the wound subsides as soon as the stitches are cut or removed" (and more organisms introduced by the "dresser" or even by the surgeon himself!).

Mr. Cheyne (Sir Watson, later) continued,"The irritation of the antiseptic employed may also interfere with healing." In spite of Lister's earlier emphatic injunctions, carbolic acid, carbolized gauze, salicylic acid (powder or ointment), acetate of aluminum, eucalyptus oil, and bichloride of mercury (and how many since that time), are all suggested for application directly to the wound surface!

Just as an afterthought—which seems to have deterred no one—he said, "Some of these antiseptics are objectionable on account of their poisonous and irritating properties." In the same volume[1] (Vol. II, p. 426) Victor Horsley said regarding the treatment of septicemia, "A vigorous attempt to attack the poison in the system should be made by administering large doses of quinine and salicylate of soda." Ice bags, sponging, and "special treatment" (not specified) were recommended for other complications. And that is about where we are now except that we have gone through the sulfa drugs and penicillin to streptomycin. We are beginning to be rational rather than empirical to the extent of better exclusion of infection both during operation and in the postoperative care. We are limiting the inflammatory processes and infectious organisms to wound areas by slowing down the lymph flow with better immobilization and actual rest. And we are now trying to use chemical cures that may not help the patient more but at least hurt him less.

Hey Groves[2] described in a few words the impasse at which most surgeons had arrived at the turn of the century as follows: "The antiseptic system aims at the destruction of bacteria . . . (by) the action of chemical bactericides. . . . The aseptic system aims at the prevention of wound infection by the exclusion of bacteria from the wound . . . (by) heat for the destruction of the germs and using no chemicals in contact with the tissues."

Hey Groves calls it "the modern system" to depend upon "vital resistance, exclusion of bacteria, and destruction of bacteria by artificial agencies."

It seems strange to have this original listerian idea so clearly expressed without going back (in 1911 or now) to 1865 and Lister himself. For that is exactly what Lister proposed with (1) his primary cleansing of skin, instruments, and surgeon's hands with carbolic acid, (2) his beeswax carbolic dressing (not in contact with the wound surface), and (3) his care to prevent the access of infection to the wound either by penetration through or around wet dressings.

It should be recalled that Lister had neither the conception of specific pus, gas, or other infections, nor the major role of soiled dressings, instruments, and fingers that we have now.

He was preoccupied with the role of the air as a carrying medium for the causes of wound putrefaction. However, his technique was more nearly correct, because of his desire to keep out all germs, than many of our procedures have been since, as we rely upon mercurochrome, the sulfonamides, or penicillin to compensate inside the wound or the patient for sins of commission and omission before, during, and after the wound comes under the care of the surgeon.

The drift away from the clinical "exclusion of the causes of putrefaction" to the laboratory search for a chemical cure for infection, which began with Lister himself and reached its climax in the Carrel-Dakin method, had the effect of leading most surgeons entirely away from rest for the wound and the patient, protection of the limb in correct position for compound fractures, and from Lister's own original idea. The wound has been exposed too much and too often in postlisterian practice to permit of an adequate regard for these important surgical principles. The confusing effect of researches on fermentation and the effects of chemical antiseptics upon Lister himself, however, was never as serious as for his followers. Lister, after all, kept his original principle of wound protection in mind. Many others who have supposed themselves to be employing the Lister method have not known what the original Lister idea really was.

Even Lister's own pupils and assistants were early led astray, as witness the following:

"As regards local treatment under such conditions, it is probably best to go on with the stuffing of the wound with gauze saturated with iodoform; or where the wound is extensive, or contains sloughs, or where there is a diffuse cellulitis in its neighborhood, it may be advisable to employ constant irrigation with the view of washing away the septic material as soon as it is formed." (27—p. 67).

That Sir Joseph Lister himself was tending in the same direction is shown by his attempt to "treat the wound" instead of adhering to his original plan of excluding infection. He said:

"The double cyanide might, I believe, be very satisfactorily used in military practice as a first dressing, by dusting it over the wound with a pepper box, and covering with any absorbent material that might be at hand. The salt might be used with the utmost freedom, as experience has shown that there is no risk of its producing poisonous effects. Some surgeons who undertook the use of the cyanide in this way in the late South African war, had unfortunately no opportunity of doing so at the front. But Mr. Sheatle informed me that granulating wounds behaved more satisfactorily with the cyanide than with idoform, while the unpleasant odor of the latter was, of course, avoided." (21—p. 48-49.)

Robert T. Morris of New York was one of the early enthusiastic antisepticists in America. Ridlon told me that Morris advertised to teach sur-

[1]Heath, Dictionary of Practical Surgery. I and II in one volume. Philadelphia: J. B. Lippincott Co., 1886.

[2]A Synopsis of Surgery. 3 ed., p. 77. New York: Wm. Wood & Company, 1911.

geons the Lister Antiseptic Method for $100.00. I have heard that when President Grant suffered from the effects of cancer of the throat, Morris wrote to the attending surgeons of New York, Philadelphia, and Washington, and offered to treat the President by the Lister method if they did not care to do so. For these and perhaps other reasons Morris was not too popular in New York. Ridlon told the story that at an annual dinner of the American Orthopedic Association at the Knickerbocker Club, he sat by William T. Bull of New York, with Bradford of Boston on the other side. Bull said that a few days before, Morris had approached him and asked whether it would do his reputation any harm to have a business association with A. M. Phelps, one of our early and aggressive orthopedic surgeons of New York. Bull said, "No." A day or two later Phelps met Bull and asked whether it would affect his professional standing adversely to be associated with Morris. Bull again said, "No."

Morris published several very sound works on the antiseptic method, but they inclined too strongly toward a chemical and too frequent dressing sort of listerism. His attitude in general is indicated by the following:

"Mr. Lister believed his wounds to be aseptic and the belief has caused greater dispute than its importance warrants; for whether or not microbes are present in a wound, it is a matter of no importance, provided that their growth be so hindered that natural reparative processes are not interfered with (101-p. 7.)

Morris' militant championship of the Lister method reflected more or less the leadership that New York assumed in the use of the antiseptic system in America. Partly for that reason, perhaps, there was some resentment in other parts of this country against the early claims made for the better surgery being done in the New York metropolis.

Although Philadelphia, as upon other occasions, voiced its criticism of the assumptions of New York surgeons, it was demonstrated that there was a basis for the New York claims not only by the final triumph of the antiseptic reform in surgery but by the results being obtained at the time.

C. B. Penrose, in the *Medical News* of October 16, 1886, reported upon "Antiseptic Surgery in the Pennsylvania Hospital." Commenting upon Penrose' article, an editorial writer of the period spoke as follows:

"New York surgeons have long been accustomed to hear their visitors from Philadelphia, after watching the painful and elaborate precautions taken to avoid or overcome infection of a wound, declare that they obtained just as good results without such appliances, and that pyaemia and septicaemia were almost unknown in their hospitals.

"With the application of strict antisepsis to a limited number of cases, very much better results were at once obtained, while the remaining cases, treated in the old way (some antiseptic appliances, but no antisepsis), ran the same course as before. A list of seventeen major operations conducted aseptically, during three months, shows very satisfactory results. If a similar condition of affairs exists in any other Philadelphia hospital it is to be hoped that a similar experiment will be promptly tried."

There are many passages in the Lister biography by Sir Rickman Godlee that indicate confusion in his mind also as to the true relationship of the original listerian idea to modern antiseptic surgery. This is nowhere more in evidence than in his discussion in 1918 of the recently proposed Carrel-Dakin method. Sir Rickman Godlee said, "Carrel's treatment would have delighted Lister. It is an extension of his own system to infected wounds, such as he only attempted or succeeded in carrying out in a limited number of cases, particularly those of operations through parts that were the seat of chronic suppuration."

One might feel that Sir Rickman Godlee supposed (in 1918) the Carrel-Dakin method to be a real refinement of or improvement upon the carbolic washes used by Lister in some of his operations. However, it seems quite certain that Lister would have objected to repeated applications of any chemical, many times a day, to any wound surface. It was always Lister's teaching that chemicals caused irritation and discharge, and delayed healing. Also, Lister most certainly would have opposed frequent exposure of the wound surface to other kinds of injury by rubber tubes, instruments, gauze dressings, and new infection.

Godlee's misapprehension as to the fundamentals of the Lister method show themselves elsewhere in his comments upon the Carrel-Dakin method. He said:

"Carrel claims to have solved the problem of the disinfection of wounds, whether the infection be acute or chronic, by means of a chemical antiseptic; and he calls this treatment "une methode chimiotherapique."[1]

It is not strange that Sir Rickman Godlee and others were deceived. In the most dogmatic way Carrel laid stress on the following points:

"The choice of a suitable antiseptic. In the search for such a substance he was helped by Dr.

[1]Carrel, A. and Dehelly, G. Le traitement des plaies infectees. Paris: Masson et Cie, 1917. English translation by Child. London: Bailliere, Tindall and Cox, 1917.

Henry D. Dakin, who, after testing a great many, fixed upon a solution of hypochlorite of sodium, polyborate of sodium, and small quantities of free hypochlorous and boric acids." (Unfortunately Lister himself had led the way in this kind of clinical research.)

"The gentle but thorough mechanical preparation of the wound: that is, the opening up of all diverticula, the removal of foreign bodies, blood clots and damaged tissue, and the complete arrest of bleeding.

"The introduction of the antiseptic fluid, either by constant irrigation, or at intervals of not more than two hours, through fine India-rubber tubes permanently fixed in all the recesses of the wound." (Lister said repeatedly not to apply chemicals to the wound surface.)

"The daily bacteriological examination of the discharges; and the closure of the wound when the number of micro-organisms has been reduced below a number which experience has shown will not interfere with the occurrence of primary union." (To undertake the sewing up of any wound containing pockets of organisms is to invite abscesses and systemic infection. There can be no clinical or laboratory test that will tell us when such a sewing up or wound closure is safe. It is a gamble with the patient's limb or life at stake in every case.)

I do not agree with the following statements of Sir Rickman Godlee:

"Carrel's treatment would have delighted Lister," and "It is an extension of his own system to infected wounds, such as he only attempted, or only succeeded in carrying out, in a limited number of cases, principally those of operations through parts that were the seat of chronic suppuration."

In the War Manual for orthopedic surgery prepared by Brackett and his associates in 1918 (Lea and Febiger) they wisely evaded the confusion regarding antiseptic wound therapy prevalent at that time. No recommendations regarding the treatment of wounds or joint injuries were made at all. Instead, the fundamental importance of correct position for injured parts and the orthopedic point of view during both primary treatment and after care was wisely emphasized throughout.

In our orthopedic manual for World War II (Saunders, 1942) the same discretion was not observed. Numerous laboratory and clinical technicians were permitted to exploit their views and certain "miracle drugs," to the great detriment not only of immobilization in correct position but even of the exclusion of infection for which Lister had provided us with better standards in 1867. That many were affected unfavorably by the highly toxic sulfa drugs is now also a matter of record.

We continue to disregard the injunctions of Lister and even of many of his contemporaries like Simpson, Tait, Cheyne, and our own Robert T. Morris (103). Some of these men were friends and some violent critics of the antiseptic system, but they all recognized the patient and his own defenses as the major ally (not the antiseptics) of the surgeon in surgical care.

Morris said, "The patient himself is to be our best ally, and in our pride of achievement with artifices against the bacterium, we are not much longer to disregard such an ally as nature gives us in the patient." (103—p. 40.)

"For the last thirty or forty years we have tried so conscientiously and so scientifically to help the patient by following up his bacteria that we ran past the patient himself altogether" (103—p. 56).

After more than forty years, during which thousands of chemicals and chemical antiseptic methods were tried and after the apparent breakdown of the antiseptic method in the World War I, we arrived at 1916 and the Carrel-Dakin method. The pretended simplicity of curing wound infections by the Carrel-Dakin program is indicated by three short quotations; with an apparent disregard for everything that had been written upon the subject previously, Dr. Carrel said:

"On the other hand, the problem would appear to be readily solved by using a substance unirritating to the tissues, and of a sufficient bactericidal power to kill all the microbes present in a wound, be their nature what they may.

"When, at the end of December, 1914, Henry D. Dakin and one of the authors of this book (Carrel) sought to discover the best means of treating wound infections, they adopted, for the reasons just stated, the method of chemio-therapy.

"The method was applied in the first place to old wounds, afterwards to recent ones. Sterilization was attained in both cases, but the earlier treatment gave more rapid results. It has long been admitted that preventative treatment of a malady costs less in money and toil than a curative treatment. However, infection can be checked even after suppuration has become established. In a word, all infected wounds were brought more or less under control by chemio-therapy."[1]

That this program differed in principle in no respect whatever from thousands of similar attempts made between the times of Lister and Carrel does not seem to have occurred to Carrel at all, and he claimed 100 per cent control of infected wounds with the same confidence that many others have—before and since. Carrel continued:

[1]Carrel, A., and Dehelly, G.: Treatment of Infected Wounds. Pp. 6-7. New York: Paul B. Hoeber, 1917.

"From May, 1915, it became evident that wounds treated after a certain method by the aid of hypochlorite or the chloramines of Dakin, were sterilized without any harm resulting to the tissues or the patient. From that date, it has been possible to prevent, in the greater number of cases, infection of wounds, and to abolish, almost entirely, suppuration in hospitals."[1] (p. 8).

And he commented somewhat sarcastically:

"Although Sir Almroth Wright's doctrine was founded, not on observations and experiments made upon wounds under actual war conditions, but upon ingenious theories and experiments in vitro, it was accepted by the majority of surgeons. One of them even affirms that asepsis ought to take the place of antisepsis, (Hear! Hear! H.W.O.) and that antiseptics not only fail to sterilize the wounds, but that they actually favor the development of microbes."[1] (p. 5).

If one may say "wound infection and wound complications" instead of "microbes," Dr. Carrel will not only have failed to make the criticism which he intended, but will have stated an important truth. A truth, moreover, which at the very beginning invalidates the premise upon which he undertook to establish the Carrel-Dakin method.

It is in the ability of the surgeon to anticipate and to assist, or co-operate with, the natural forces of the patient in his recovery, that he may often be useful at all.

It should be remembered that many of the accidents that occur to surgical patients occur in the course of the efforts on the part of the tissues, or on the part of the patient himself, to get well. For example, an artery with an ulcerated wall, which may be the source of even fatal hemorrhage, or a large segment of one of the long bones which undergoes necrosis and becomes a sequestrum is an incident in the efforts of the patient to evacuate pus from a cavity which has not been drained early or adequately by his attending surgeon. If this abscess cavity is drained sufficiently early, the sloughing of the tissues to provide an avenue for the escape of pus or the involvement of the artery in the ulcerative process may be avoided, and the patient may evacuate his suppurating cavity safely. But for his protection, the incision must have been made in the right place and at the right time by his surgical attendant. Moreover, in the postoperative care the use of mechanical or chemical barriers to prevent the addition of other organisms and the development of symbiosis is equally the opportunity and responsibility of the surgeon who is standing by. Against many accidents to the wound the patient is as helpless without special help as he is against internal changes that occur within his own structures, unless he receives intelligent and prompt assistance from those who have been trained to understand his symptoms, to interpret the steps and the progress either of his disease or his recovery, and to apply those measures with which the surgeon should have become familiar as a result of our thousands of years of experience.

[1]Carrel, A., and Dehelly, G.: Treatment of Infected Wounds. New York: Paul B. Hoeber, 1917.

The surgeon can serve best by protecting the wound surface, the inflamed part, and the patient against trauma, chemical irritation, and infection, and by limiting any or all these factors to the original area of injury or operation.

For this we have improved but little upon the rules laid down by Lister and Hugh Owen Thomas.

Exclusion of infection and the kind of immobilization that slows down lymphatic flow and limits organisms and toxins to the injured parts is all that the patient usually requires. With reduced amounts of infection and systemic toxemia, he can usually muster the requisite resistance and physiologic defence "just as in a simple fracture."

At any rate it is to be considered that until we do have specific cures for pus organisms or specific body defenses for wound infections, we should attack less and defend more in the interest of recovery by rest "enforced, uninterrupted, and prolonged."

REFERENCES

1. ALLBUTT, SIR CLIFFORD. "LISTER." Encyclopedia Britannica. 11 ed.
2. ASHHURST, A. P. C. The Centenary of Lister (1827-1927). Tr. Coll. Physicians, Philadelphia, 1927.
3. BALDWIN, ST. G. Personal Reminiscences of Joseph Lister. Acad. Med. Toronto, April 2, 1912.
4. BANKS, W. M. Fetish Worship in Aseptic Surgery. Braithwaite's Retrospective Med., 1897, 115: 288-292.
5. BASTIAN, H.C. The Modes of Origin of Lowest Organisms. London: Macmillan & Co., 1871.
6. BEATSON, G. Modern Wound Treatment. Edinburgh: E. & S. Livingston, 1913.
7. Idem. Brit. M. J., 1927, 1: 622.
8. BECK, C. A Manual of Surgical Asepsis. Philadelphia: W.B. Saunders, Co., 1895.
9. BELL, J.B. Med. Advance, 1889, 23: 73-102.
10. BERNARDY, E. Biniodide of Mercury. Its Antiseptic Use. Philadelphia: Wm. J. Doran, 1889.
11. BERNAYS, A.C. Golden Rules of Surgery. St. Louis: C.V. Mosby Co., 1906.
12. BILLROTH, THEODOR, General Surgical Pathology and Therapeutics. New York: D. Appleton & Co., 1884.
13. BINGHAM, G.A. Surgical Practice and Its Daily Debt to Lister. Acad. Med. Toronto, April, 2, 1912.
14. BLAND-SUTTON, SIR J. An Appreciation of Lord Lister. Surg., Gyn. Obst., 1927, 45: 867.

Annotated Bibliography of Listeriana. All of the items are in the H. Winnett Orr Collection.

15. BUCHMAN, C.M. Antisepsis and Antiseptics. Newark: Terhune Co., 1895.
16. BULL, P. Lord Lister. Oslo: Steenske Forlag, 1927.
17. BULLOCH, W. Lister as a Pathologist and Bacteriologist. Brit. M. J., 1927, 1: April 9.
18. BUM, A. Trockenes Wundverfahren. A. Landerer. Wiener Klinik. Vienna: Urban & Schwarzenberg, 1890.
19. CAMAC, C.N.B. Epoch Making Contributions to Medicine, Surgery, and the Allied Sciences. Philadelphia: W.B. Saunders Co., 1909.
20. CAMERON, SIR H.C. Brit. M. J., 1902, 2: 1842.
21. Idem. On the Evolution of Wound Treatment during the Last 40 Years. Glasgow: James MacLehose & Sons, 1907.
22. CAMERON, I.H. The Influence of the Researches of Pasteur and Lister on Surgical Pathology. Acad. Med. Toronto, Apr. 3, 1912.
23. ——— CANAD. J. M. & S. Lister Symposium at the Toronto Academy of Medicine. Apr. 2, 1912.
24. CARREL, A. Bull. Acad. méd., Par., 1915, 74: 361.
25. CHEYNE, SIR W.W. Lister and His Achievement. London: Longmans, Green & Co., 1886.
26. Idem. Nature, Lond., 1927, 120: 161.
27. Idem. The Treatment of Wounds, Ulcers, and Abscesses. Philadelphia: Lea Brothers & Co., 1895.
28. Idem. Suppuration and Septic Diseases. Edinburgh & London: Young J. Pentland, 1889.
29. CHURCHMAN, J.W. Modern Treatment of Wound Infections. Internat. M. & S. Survey, 1918, 2: 31.
30. CREDE, B. Verh. Deut. Ges. Chir., 1896, 25: 127-132.
31. CUMMINGS, J. An Inquiry into the Theory and Practice of Antiseptic Surgery. Edinburgh: MacClachlen & Stewart, 1872.
32. DE LA TORRE, V. Respuesta organica a las Inyecciones de pus aseptico. Guadalahara, 1934.
33. DENNIS, F.S. Selected Surgical Papers (1876-1914). Collected Writings I-II. Privately printed. New York, 1934.
34. DERBY, G. Boston M. & S. J., 1886, 77: 271.
35. DORAN, A.H.G. Descriptive Catalog of the Surgical Instruments of Lord Lister in the Royal College of Surgeons. London: Taylor & Francis, 1925.
36. DRINKWATER, H. 50 Years of Medical Progress, 1873-1922. London: H.K. Lewis, 1924.
37. DUCLAUX, E. Pasteur. Histoire d'une Esprit. Leaux: Chamaire et cie, 1896.
38. DUKES, C. Lord Lister. London: L. Parsons, 1924.
39. DUMAS, J. Technique of the Irrigation Treatment of Wounds by the Carrel Method. New York: Paul B. Hoeber, 1917.
40. FLEXNER, S. Pasteur on Immunity and Therapy. N. York Acad. M., Jan. 10, 1923.
41. GALLOWAY, H.P.H. Canad. M. Ass. J., 1929, 21: 9-17.
42. GAMGEE, S. On the Treatment of Wounds and Fractures. London: J. A. Churchill, 1883.
43. Idem. Richmond and Louisville M. J., 1879, 25: 421.
44. GARRISON, F.H. Lister in Relation to the Victorian Background. N. York Acad. M., Jan., 1928.
45. GERRISH, F.H. Antiseptic Surgery of Lucas-Championniere. Portland: Loring, Short & Harmon, 1881.
46. GERSTER, A. G. Aseptic and Antiseptic Surgery. New York: D. Appleton & Co., 1891.
47. GILCREEST, E.L. Tr. South. Surg. Ass., 1927, 40: 166-174.
48. Glasgow Centenary. Brit. M. J., 1927, 1: 683-684.
49. GODLEE, SIR R. J. Suppuration of the elbow. Med. Rec. N. Y., 1882, 22: 346.
50. Idem. Lord Lister, Oxford: Clarendon Press, 1924.
51. Idem. Lord Lister. London: Macmillan & Co., 1918.
52. Idem. Proc. R. Inst., Grt. Britain, 1917-1918, 21: 380-296.
53. GODLEE, SIR. W., "Lister." Book Review by F. PACKARD. Ann. M. Hist. 1925, 7: 201. New York: Paul B. Hoeber.
54. GRADLE, H. Bacteria and the Germ Theory of Disease. Chicago: W. T. Keener, 1883.
55. GRASETT, F.L. Ms. Notebook from Lister Lectures and Clinics of 1870-1871. Contributed by A. B. LeMesurier of Toronto.
56. GRAY, H. The Early Treatment of War Wounds. London: Henry Frowde, 1919.
57. HARTZOG, H.S., JR. Triumphs of Medicine. New York: Doubleday, Page & Co., 1927.
58. HEATH, C. A Manual of Minor Surgery and Bandaging. Philadelphia: Lindsay & Blakiston, 1875.
59. HILL, L.L. Am. J. Surg., 1927, 3: 99.
60. JOHNSON & JOHNSON. Lister and the Ligature. A Landmark in the History of Modern Surgery. New Brunswick, N. J.: Johnson & Johnson, 1925.
61. KEEN, W.W. Surg. Gyn. Obst., 1927, 45: 861.
62. Idem. Before and After Lister. Science, 1915, n.s. 41: pp. 845-853, 881-891.
63. Idem. The Treatment of War Wounds. Philadelphia: W. B. Saunders Co., 1917.
64. KLEIN, E. Relations of Septic to Pathogenic Organisms. London: Eyre & Spottiswoode, 1884.
65. LAIRD, J.L. Antiseptics and Their Choice in Infection. Detroit: Reprint Ther. Gaz. Feb. 15, 1924, Swift Pub. Co., N.Y., 1925, 7: 201. 1924.
66. LANDERER, A.L. Trockenes Wundverfahren. Bum, A. Wiener Klinik. Feb., 1890.
67. LEESON, J.R. Lister As I Knew Him. New York: 1927.
68. LEMAIRE, J. De L'acide Phenique. Paris: Germer-Balliere, 1863.
69. LISTER, SIR J.B. Lancet, Lond., 1867, 1: Mar. 16, 23,30.
70. Idem. Antiseptic Method. Thomas, H. O. p. 183. Liverpool, 1876.
71. Idem. Antisepsis. MacCormac. W. London: Smith Elder & Co., 1880.
72. Idem. Lancet, Lond., 1889, 2: 943; also J. Am. M. Ass., 1889, 13: 820.
73. Idem. Brit. M. J., 1890, 2: 377; also Wood's M. & S. Monographs, Vol. 3, 1890.
74. Idem. J. Am. M. Ass., 1890, 15: 576-577.
75. Idem. Internat. J. Surg., 1893, March.
76. Idem. Brit. M. J., Dec. 13, 1902.
77. Idem. The Third Huxley Lecture Delivered before Medical School of Charing Cross Hospital, London: Harrison & Sons, 1907.
78. Idem. The Collected Papers of Joseph, Baron Lister. Vols. 1 and 2. Oxford: Clarendon Press, 1909.
79. LITTLE, J.L. Lister's Antiseptic Method of Treating Surgical Injuries. New York: J.C. Putnam's Sons, 1878.
80. LOCKWOOD, C.B. Traumatic Infection. Hunterian Lect. Royal College of Surgeons. Edinburgh & London: Young J. Pentland, 1896.
81. LONGMORE, T. A Treatise on Gunshot Wounds. Philadelphia: Lippincott & Co., 1862.
82. MACCORMAC, W. Manuel de chirurgie antiseptique. Trans. by Lutaud, A., 1882. Appendix and Discussion by Bryant, MacNamara, Barwell, Wells, *et al.* Bart., K.C.V.O.
82a. Idem. An Address of Welcome Delivered at the Centenary Festival of the Royal College of Sur-

geons of England, July 26, 1900. London: Ballantyne Hanson & Co., 1900.
83. MACDONALD, G. Reminiscences of a Specialist. London: Allen & Unwin, 1932.
84. MACFIE, R.C. The Romance of Medicine. London: Cassell & Co., Ltd., 1907.
85. MAISEL, A.Q. Miracles of Military Medicine. New York: Garden City Co., 1944.
86. MALLOCH, A. Symposium in Memory of Lister. Supp. to N. York Acad. M., Vol. 4., 1928; Bull. N. York Acad. M., Lister Scrapbook, p.41.
87. Idem. Biographical sketch and memorabilia of Lister. N. York Acad. M., January, 1928.
88. Idem. Letter by Lister to British Medical Journal, Dec. 14, 1902. Brit. M. J., 1927, 1: 676.
89. Idem. President's Address. IX B. p. 127. Oct. 1927.
90. MALLOCH, A.E., SR. Acad. Med. Toronto. Testimonial, April 2, 1912.
91. Idem. Repr. of ms., Letter in Supp. to N. York Acad. M., Jan., 1928.
92. MARCY, H.O. J. Am. M. Ass., 1891, 16: 229-31.
93. Idem. Personal Reminiscences of Lord Lister. Acad. Med. Toronto, April 2, 1912.
94. Idem. Tr. South. Surg. Ass., 1914, 27: 138-156.
95. MARKOE, Thomas W. "Diseases of the Bones." Modification of the Lister Antiseptic Method. New York: D. Appleton & Co., 1872.
96. MAYLARD, A.E. Lister and the Lister Ward. Glasgow: Jackson, Wylie and Co., 1927.
97. MAYO, W.J. The Fourth Epoch of Medicine (Lister Centenary) Detroit, Oct. 4, 1927. Surg. Gyn. Obst., 1927, 45: 864.
98. MCMURTRY, L.S. J. Am. M. Ass., 1889, 12: 572.
99. MILES, A. The Edinburgh School of Surgery before Lister. London: A. & C. Black, 1918.
100. MOORHEAD, J.J. Traumatic Surgery. Philadelphia: W. B. Saunders, 1917.
101. MORRIS, R.T. How We Treat Wounds Today. New York: G. P. Putnam's Sons, 1890.
102. Idem. Fifty Years a Surgeon. New York: Dutton, 1937.
103. Idem. Dawn of the Fourth Era in Surgery. Philadelphia: W. B. Saunders Co., 1910.
104. MORROW, A.S. The Immediate Care of the Injured. London: W. B. Saunders Co., 1906.
105. MORTON, T. Acetanilid as an Antiseptic. Trans. Phila. Co. Med. Soc., 1894.
106. MOSETIG-MOORHOF, A. Handbuch der Chirurgischen Technik. Leipzig and Vienna: F. Deuticke, 1899.
107. MOYNIHAN, B.G.A. Hunter's Ideal and Listers Practice. Brit. M. J., 1927, 1: 313, 319.
108. Idem. Leadership in Medicine. London: Oxford University Press, 1933.
109. Idem. Brit. M. J., 1927, 1: 656.
110. NEUDORFER, I.J. Antisepsis and Its Relation to Bacteriology. Wood's M. & S. Monographs, 1889, 3: 3, 312.
111. Idem. Ruckblick auf ein Viertel jahrhundert Antiseptick. Vienna: Alfred Holder, 1893.
112. NEVITT, H.R. Pre-Listerian Surgery. Acad. Med. Toronto, April 2, 1912.
113. NEWELL. O.K. The Best Surgical Dressing; How to Prepare It and How to Use it. With Consideration of Beach's Principles of Bullet-Wound Treatment. Boston: Cupples & Hurd, 1888.
114. NUSSBAUM, J.N.von Kriegs-Chirurgie aus einem klinischen Vortrage. Munich: J. A. Finsterlin, 1877.
115. ORR, H.W. Sir Joseph Lister and Modern Surgery. Address at Lincoln General Hospital, Lincoln, Nebraska, 1927.
116. Idem. Listerism. Am. J. Surg., 1928, 4: 465-474.
117. Idem. New Era in the Treatment of Osteomyelitis and Other Infections. St. Paul: Bruce Pub. Co., 1930.
118. Idem. J. Bone Surg., 1937, 19: 575-583.
119. PACKARD, J.H. Surgical Dressings and Antiseptics. Philadelphia & London: Ann. Univ. Med. Sc. 0-1. F.A. Davis Co., 1888-1895.
120. PAGET, S. Pasteur and After Pasteur. London: A. & C. Black, Ltd., 1914.
121. PALMER, H.B. Surgical Asepsis. Philadelphia: F. A. Davis Co., 1903.
122. PARK, R. Antiseptics. Ref. Handbook of Medical Sciences, New York: Wm. Wood & Co., 1886, Vol. I. p. 256.
123. Idem. Am. Abst. & Surg., 1883, 7: 114.
124. PASTEUR, L. Souvenir de Paris. 1883.
125. Idem. Influence of Researches of I. H. Cameron, 1912. Centenary of Pasteur—Celebration and Exhibition. N. York Acad. Med., December, 1922, to January, 1923.
126. PATERSON, R. Memorials of the Life of James Syme. Edinburgh: Edmonston & Douglas, 1874.
127. PATON, D.M. A Solution of the Septic Problem. London: Bailliere & Co., 1927.
128. PILCHER, L.S. Treatment of Wounds. New York: Wm. Wood & Co., 1883.
129. Idem. The Treatment of Wounds. New York: Wm. Wood & Co., 1889.
130. POWER, D'A. Wounds in War. New York: Oxford Loose Leaf Surgery, 1915.
131. PRINCE, D. S. Louis M. & S. J., 1888, 49: 30 pp.
132. PYE, W. Surgical Handicraft. Vols. 1 and 2. London: H. Kingston, 1884-1885.
133. RANNEY, A.L. N. York Med. Abst., 1881, 1: No. 12.
134. REVERDIN, A. Antisepsie et Asepie. Paris: Rueff & Co., 1894.
135. ROBB, H. Aseptic Surgical Technique. Philadelphia: J. B. Lippincott Co., 1894.
136. ROBERTSON, A. "L-P" The Treatment of Inflammation and Sepsis by Lipoid-Paraffin Dressings. London: Geo. Routledge, 1919.
137. ROCKWELL, G.E. Streptococcus Blood Stream Infections. New York: Macmillan Co., 1931.
138. SALEEBY, C.W. Surgery and Society. New York: Moffat, Yard, & Co., 1912.
139. SANSOM, A.E. The Antiseptic System. London: H. Gillman, 1871.
140. SCHIMMELBUSH, C. A Guide to the Aseptic Treatment of Wounds, Translation by F. J. Thornbury. New York: G. P. Putnam's Sons, 1900.
141. SENN, N. Four Months Among the Surgeons of Europe. J. Am. M. Ass., 1887, p. 63.
142. SENSENY, B.R. Treatment of Hospital Gangrene. M. & S. Reporter, Apr. 9, 1864.
143. SHERRINGTON, SIR C.S. Brit. M. J., 1927, 1: 653.
144. SIMPSON, J.Y. Carbolic Acid and Its Compounds in Surgery. Boston M. & S. J., 1867, II: Dec. 12
145. SINCLAIR, SIR W.J. Semmelweis, His Life and His Doctrine. Manchester: University Press, 1909.
146. TURNER, A.L. Joseph, Baron Lister. Edinburgh and London: Oliver & Boyd, 1927.
147. VOLKMANN, R. Chic. M. Rev., 1880, 1: 147.
148. WAINWRIGHT, W.A.M. The Modern Treatment of Wounds. Hartford: Case, Lockwood, & Brainard Co., 1887.
149. WEHMER, R. Desinfektion. See Eulenberg, A. Real-Encyclopadie. 1908, 3: 737.
150. WELCH, W.H. Am. J. M. Sc., 1891, p. 455.

151. Idem. Pasteur Contributions to Biology, N. York Acad. M., January 10, 1923.
152. Idem. Ref. Handbook of Medical Sciences Vol. 9, p. 1083-54. New York: Wm. Wood & Co., 1886.
153. Wellcome Historical Medical Museum. Lister Centenary Exhibition. A Handbook. London: The Wellcome Foundation, Ltd., 1927.
154. Idem. Handbook of Lister Collection. Brit. M. J., 1927, 1: April 9.
155. WETHERILL, H.G. Presentation of the Lister Memorial Tablet. Detroit, Oct. 4, 1927. Surg. Gyn. Obst., 1927, 45: 858.
156. WHEELER, W.I. DE C. Selected Papers on Surgical Topics. Dublin: T. Drought, 1916.

ABSTRACTS OF CURRENT LITERATURE

SURGERY OF THE HEAD AND NECK

HEAD

Bailey, H.: Parotidectomy; Indications and Results. *Brit. M. J.*, 1947, 1: 404.

Emphasis is made on the fact that the parotid gland is a bilobed structure consisting of a large superficial, and a small deep lobe connected by an isthmus. The author compares the facial nerve to the meat within the parotid sandwich. It is his avowed purpose to dispel deep rooted misconceptions concerning parotid tumors. These misconceptions are related to the relationship of the facial nerve and the bogy of facial palsy. This has resulted in ill advised recommendations to leave the tumor alone, or to wait until it gets larger, it apparently not being realized that as a consequence the seventh nerve will be eventually involved by the tumor anyway, and this can be prevented only by surgery. By this time the tumor has become widespread, and it is well to remember that the superficial appearance of the tumor nowise represents its true size. The tumor is likened to a veritable iceberg. It usually arises in a comparatively circumscribed area, a little in front of and above the angle of the jaw. The only other common starting point is in the region immediately in front of the tragus. Here the differential diagnosis between an enlarged preauricular lymphatic gland and a mixed parotid tumor is impossible at first, but if the lesion does not subside it is well to consider it a parotid tumor.

True cysts of the parotid are exceedingly rare. The author has seen only 1 case among 100 cases of nonimflammatory swellings of the parotid gland. Adenolymphomas, which are cystic tumors probably arising from the lymphoid conglomerate that surrounds the first branchial cleft, are definitely benign. Such tumors are exceedingly rare, and it is quite impossible to distinguish them from degenerating mixed parotid tumors. Since the operative procedure is less radical for this condition, one should take care not to diagnose the condition unless it is bilateral, since an inadequate operation would be done for the neoplastic parotid condition as a consequence.

The author stresses the fact that nearly all parotid tumors are completely radioresistant, but despite this fact such therapy is all too frequently recommended to avoid a facial nerve palsy.

He is a strong advocate of subtotal or total parotidectomy rather than enucleation for all cases of mixed parotid tumors. The latter procedure is dangerous because frequently the smaller lesions are merely satellites of the larger lesion. This accounts for the apparently large number of recurrences (30%) in operations performed for small lesions. The author believes that malignant cells spilled during intracapsular enucleation, or cells left in the interior of a portion of the capsule that has not been entirely removed account for 90 per cent of the recurrences.

It is advocated that a J-shaped incision be made, beginning at the level of the zygomatic arch, proceeding down the side of the face as close as possible to the pinna, and curving around the root of the lobule of the ear to end on the tip of the mastoid process. A large flap of skin is reflected by undercutting. If the whole parotid gland is not in view, the incision must be enlarged still farther by extending it down the neck from the tip of the mastoid process, along the anterior border of the sternocleidomastoid muscle. No attempt should be made to remove any parotid tumor until the whole gland is in full view. Only then, or even after an extracapsular resection has been begun, is it possible to tell how deeply the tumor plunges into the gland. The external carotid artery should be ligated to minimize bleeding. The temporofacial division of the seventh nerve is seen clearly once the superficial lobe has been mobilized. In extracapsular resection sufficient parotid tissue should be removed to ensure that the tumor capsule is not encroached upon. If the tumor is found to extend deeply, rather than risk cutting the branches of the facial nerve, this operation should be abandoned in favor of superficial lobectomy. The author has done 33 such operations and has noted a salivary fistula in only 1, and this healed within a year.

After operations upon the parotid gland that involve dissection of the seventh nerve and the free use of 60 per cent alcohol in the wound, a major degree of facial palsy always occurs and may persist for weeks or months. Early, it is well to support the facial musculature by strips of adhesive plaster and, later, in cases in which drooping of the mouth persists, Dahlberg's internal splint, which is a dental prosthesis, is best. In 4 cases in which the author had known that he had cut the primary division of the facial nerve, the patients eventually either completely recovered or recovered to such a degree that they are unaware that the nerve is not functioning fully. He believes that the anastomotic twigs connecting the temporofacial and cervicofacial divisions of the seventh nerve, anterior to the parotid isthmus, account for the eventual restitution of function of the seventh nerve when one of its primary divisions is known to have been severed.

In 2 cases the main trunk of the facial nerve was cut, and in these instances a strip of fascia was inserted subcutaneously with good effect.

The author fears most the auriculotemporal (Frey's) syndrome following nerve injury in which the patient's cheek becomes red, hot, and painful, and beads of perspiration appear upon it when he is

eating. There is also hyperesthesia of the face, especially during shaving.

LEROY J. KLEINSASSER, M.D.

EYE

Bellows, J. G.: Ocular War Injuries. *Am. J. Ophth.*, 1947, 30: 309.

Bellows reports his findings in 300 consecutive cases of ocular war injuries. Although the eyeball measures only 1/375 of the body surface, it is frequently injured because of its vulnerability to small particles which might go unnoticed if imbedded in the skin. In each succeeding war there has been an increase in the number of ocular injuries in relation to the injuries to all other parts of the body. Estimates of the eye injuries in World War II vary from approximately 2 per cent of all injuries to from 15 to 17 per cent, according to the type of warfare. This series of 300 consecutive patients presented: 13 blast injuries; 40 indirect injuries; 290 direct injuries, among which there were 54 nonpenetrating injuries, 206 penetrating injuries and 30 direct injuries to the eye lids, extraocular muscles, and orbit; and 9 cases of burns of the eyeball and eyelids. In 52 cases the injuries were bilateral.

Blast injuries may result from the explosion of shells, grenades, or mines. Dust and debris may be driven into the eye by the blast during sudden compression and expansion of the atmosphere. Blast injuries may produce chemosis; hemorrhage causing proptosis and optic atrophy; intraocular hemorrhage following iridodialysis or rupture of a retinal vessel; hemorrhage due to rupture of the choroid and from the retina; and acute iridocyclitis with secondary glaucoma.

Thermal injuries were received by 3 soldiers; they were burns due to fire and burning gasoline. The eyelids were burned and corneal opacities were present.

Indirect injuries result from concussion waves produced by rapidly moving missiles in the vicinity of the eyeball. These injuries more often involve the posterior segment than the anterior because the macular area is the most fragile and vulnerable region. The symptoms and findings vary with the nature of the lesion and may appear immediately or several days or months later. They comprise traumatic liporrhagic retinitis (hemorrhages, exudates, edema, destruction of arteries, and dilatation of veins), paralysis of the orbicularis, pulsating exophthalmos, and changes in the vitreous, choroid, retina, and optic nerve.

Direct or contact injuries are produced by the impact of a missile upon the eyeball. Contusion, perforation, penetration, laceration, and avulsion may occur.

Nonpenetrating or contusion injuries may reveal corneal abrasions, imbedded foreign bodies in the cornea, conjunctiva, or sclera, or rupture of the eyeball. According to Markelova, 58 per cent of ocular military injuries are nonperforating. The following symptoms and signs may be found: hyphemia deep in the anterior chamber, tears of the iris, iridodialysis, rupture of the margin of the pupil, iridodonesis, mydriasis or deformity, dislocation of the lens, cataract, and hypotony.

Penetrating injuries generally involve the cornea more than the sclera. One hundred and four cases among 206 in this series required enucleation; 65 eyes retained foreign bodies.

Rupture of the eyeball in 105 cases required primary enucleation or early secondary enucleation.

Intraocular foreign bodies were most frequently found to have entered the eye through the cornea. In war, bilateral involvement is frequent and the particles are smaller, multiple, and nonmagnetic or weakly magnetic in contrast to foreign bodies in civilian life. A foreign body within 3 mm. from the center of the cornea is considered anterior to the lens; between 3 and 7 mm., within the lens; and between 7 and 24 mm., within the vitreous humor. Copper may produce a purulent reaction or chalcosis bulbi. Aluminum, rock, glass, and lead are well tolerated.

The following pathologic lesions were observed in 65 cases: cataract, 30 cases; iris and pupillary lesions, 20; corneal opacities, 18; intraocular hemorrhages, 17; phthisis bulbi, 13; chorioretinitis, 11; adherent leukoma, 9; retinal detachment, 8; vitreous opacities, 7; endophthalmitis, 4; rupture of the choroid, 3; siderosis bulbi, 3; chalcosis bulbi, 2; hole at the macula, 1 case; avulsion of optic nerve, 1; and sympathetic ophthalmia, 1.

Accurate localization is an important factor in the proper management of intraocular foreign bodies. The Berman metal locator is of value in localizing intraocular foreign bodies, but a negative reaction does not preclude the presence of a magnetic foreign body. The posterior surgical approach was employed in nearly all cases. Among 65 cases of intraocular foreign bodies, 29 magnetic particles were removed. In 4 of these cases 1 or more other particles still remained within the eyeball which indicated that magnetic and nonmagnetic foreign bodies are often combined. In 36 eyes the foreign body was considered nonmagnetic.

The results are summarized as follows: in 20 cases enucleation was done; 4 eyes were preserved but blindness resulted in 22 cases the visual acuity was less than 20/200; in 13, the visual acuity was between 20/200 and 20/40; and in 6, the acuity was 20/30 or better.

JOSHUA ZUCKERMAN, M.D.

Bey, H.: Some Observations on the Symptomatology and Diagnosis of Cases of Proptosis. *Brit. J. Ophth.*, 1947, 31: 155.

The author reviewed his cases of proptosis and classified their origin into three groups. The extraorbital causes of proptosis were due mainly to the frontal and ethmoidal paranasal sinuses and were usually of an inflammatory nature. Nasal trauma, mucoceles, pyoceles, and neoplasms were not uncommon causes. Nasopharyngeal tumors, both simple and malignant, occasionally caused propto-

sis. In the intraorbital category, the proptosis was found to be due to inflammatory conditions, cysts, or new growths. The condition in 23 of the 31 cases in this group was caused by new growths. Proptosis due to disease of the bony wall of the orbit was the least common, and was caused by an extensive arteriovenous varix, a capillary angioma, and inflammatory conditions of the orbital wall.

Middle and posterior ethmoiditis may spread into the orbital cavity and produce proptosis but may not present any clinical evidence intranasally. In some of the author's cases x-ray examination in the classical positions proved negative, but repeated x-ray examinations showed the cause to be an ethmoiditis. A comparative x-ray study of both orbits may show an x-ray shadow of a tumor mass or a dilation of one orbit. Shadows produced by soft tissue masses were of two types, the dense and the light. Dense shadows were always diagnostic of an underlying cause of proptosis. Light shadows showed as veiling, particularly over the orbital periphery, and were always found to correspond to a congestion of edematous orbital tissues, and therefore demonstrated only secondary manifestations of the cause of the proptosis. An orbital dilatation not due to communication with a sinus has been found to be consistent with the presence of an intraorbital lesion. This sign was positive in 16 out of 21 cases. The author suggests a therapeutic test in cases of proptosis that could be caused by sinusitis or a gumma. Exploration and biopsy should be resorted to in obscure conditions, and biopsy should be done in any case having an appearance of malignancy on exploration, before further surgery is done. Punctures of cysts increase the difficulty of removing the tumor and the possibility of spreading malignant tumors. ROGER H. JOHNSON, M.D.

Zondek, B., Landau, J., and Bromberg, Y. M.: Allergy to Endogenous Hormones as a Cause of Keratitis Rosacea. *Brit. J. Ophth.*, 1947, 31: 145.

The authors found that a certain percentage of patients suffering from typical allergic symptoms had a hypersensitivity to their own hormones, and it was suggested that this could occur in either men or women independent of their genital function. In general, allergic eye conditions are ascribed to hypersensitivity of the ocular tissues to exogenous proteins. However, it is also thought that the human eye tissue can be allergic to endogenous products of metabolism, as in sympathetic ophthalmia and phakoanaphylactica where endogenous uveal pigment and lens proteins are the exciting agents.

The authors attempt to determine whether or not keratitis rosacea can be caused by the presence in the ocular tissue of an allergy to endogenous hormones. In 6 cases of keratitis rosacea (3 men and 3 women) they tested for the presence of allergy to the various hormones by intracutaneous tests. In all 6 cases they found a hypersensitivity to testosterone alone, and they explained this, in women, by mentioning that the adrenal tissue also produced testosterone. All 6 cases had been refractory to accepted methods of treatment and had shown gradual progression of symptoms. In 5 cases the condition was treated by daily subcutaneous injections of small and gradually increasing doses of testosterone, and in 3 cases by implantations of testosterone pellets. All patients had a cessation of eye symptoms and an improvement in objective eye findings as well as of the facial rosacea. Keratitis rosacea has frequent spontaneous remissions. Although some recurrences have been experienced in the authors' cases, the therapeutic results have been such as to lead them to the conclusion that this treatment is specific.

ROGER H. JOHNSON, M.D.

Bárány, E. H.: The Influence of Intraocular Pressure on the Rate of Drainage of Aqueous Humor. Stabilization of Intraocular Pressure or of Aqueous Flow. *Brit. J. Ophth.*, 1947, 31: 100.

Duke-Elder has proposed a "safety-valve action" theory of aqueous drainage mechanism which postulates that there is no flow of aqueous at normal intraocular pressure, but that when this pressure is raised there is drainage of aqueous into the drainage channels. However, others have demonstrated a continuous aqueous outflow in man. Since previous methods of measuring the pressure in the drainage channels were done with a cannula under unphysiologic conditions, the author has suggested a new method on a completely intact rabbit's eye. Previous experimentation has shown that unilateral closing of the common carotid in rabbits reduced the mean blood pressure in the ophthalmic artery about 30 to 40 mgm. from a normal level of 100 mgm., and the intraocular pressure by about 4 mm. of mercury from the normal level of about 30 mm.

The author injected radioactive sodium isotrope Na (24) intraperitoneally and later measured the sodium concentration in the aqueous drawn from both eyes. Carotid occlusion hardly (or not at all) changed the equilibrium concentration of the sodium in the aqueous, and showed that the relative change in aqueous outflow caused by carotid closure must be very nearly equal to the relative change in the rate of entrance of sodium. Calculations further showed that the reduction in rate of entrance of sodium was about 7 per cent, which then very nearly represented the reduction in aqueous outflow caused by carotid occlusion. This result certainly does not support the idea of an overflow mechanism in the intact rabbit's eye. A drop of 10 to 15 per cent in the intraocular pressure should have given a much more pronounced reduction in aqueous outflow if an overflow mechanism had really existed. Therefore there must be some kind of a relative stabilization of rate of aqueous flow. It was assumed that the outflow of aqueous consists of two parts—a hydrostatic part which changes directly with the intraocular pressure and an osmotic factor which is more or less constant. However, the blood in the drainage vessel becomes more or less diluted by aqueous humor when it absorbs the efflux

from the anterior chamber, which reduces the osmotic attraction along the path of the blood through the vessel. When the intraocular pressure rises, more aqueous humor is forced out hydrostatically; the dilution will become greater and the colloidal osmotic attraction consequently smaller. When the intraocular pressure falls, the blood in the vessel becomes less diluted and the colloidal osmotic attraction for aqueous rises, which produces a mechanism that tends to maintain a relatively constant flow of aqueous humor, in spite of a changing intraocular pressure—the direct opposite of an overflow mechanism. Thus, the osmotic factor in the aqueous outflow mechanism reduces the efficiency of the drainage mechanism in its role of stabilizer of the intraocular pressure. This constant aqueous flow may be a mechanism for protecting the lens. What the situation is in man remains to be seen since man has no trabecular vein. ROGER H. JOHNSON, M.D.

EAR

House, H. P.: Indications for the Fenestration Operation. *Arch. Otolar.*, Chic., 1947, 45: 312.

In selected cases of clinical otosclerosis the fenestration operation has proved of definite value in restoring practical, serviceable hearing.

It is generally accepted that any patient with a bilateral conductive type of hearing impairment who has intact ear drums and patent eustachian tubes and who does not exhibit other obvious pathologic conditions of the ear may be considered as having clinical otosclerosis.

The degree of function of the cochlear nerve is determined by both the tuning fork and audiometric testing. If the patient with clinical otosclerosis has loss of serviceable hearing, the duration of bone conduction over air conduction with a 1024 fork is in direct proportion to the degree of cochlear nerve function present. This simple procedure serves as a ready means of confirming the audiometric findings.

Candidates for the fenestration operation may be classified as ideal, borderline, and nonsuitable, according to the amount of nerve function present in the speech frequencies.

Group 1, ideal candidates for fenestration. The members of this group hear the V. Mueller magnesium alloy 1024 tuning fork 10 seconds or more longer by bone conduction than by air conduction, and their nerve loss as shown by audiometry is 10 decibels or less for the speech frequencies.

Group 2, borderline candidates for fenestration. The members of this group hear the 1024 fork from 5 to 10 seconds longer by bone conduction than by air conduction. Their nerve loss as shown by audiometry does not exceed 20 decibels for two speech frequencies and is not more than 30 decibels for the remaining 2048 frequency.

Group 3, candidates not suitable for fenestration. The members of this group hear the 1024 fork longer by air conduction than by bone conduction. Their nerve loss as shown by audiometry is more than 20 decibels for two speech frequencies or more than 30 decibels for the remaining 2048 frequency.

If the curve of nerve function continues downward in the frequencies above 2048, the prognosis does not seem as good as it does in the cases in which the curve continues at the same level in the higher frequencies.

A total of 49 patients were classified as of group 1. Of these, 39, or 79 per cent, have maintained practical, serviceable hearing longer than 6 months.

A total of 62 patjents were classified as of the borderline group. Of these, 34, or 55 per cent, have maintained serviceable hearing longer than 6 months.

Among this series of 111 persons who were observed for more than 6 months after they underwent the fenestration operation for otosclerosis there were no serious complications. Three thought that their hearing was worse after the operation, but audiometric studies revealed both the bone and the air conduction curves to be at the preoperative level.

Six persons belonging to the third group were operated upon with the following results: 2 obtained restoration of practical serviceable hearing, 3 showed an audiometric gain but hearing did not reach the serviceable level, and 1 of them, operated upon for tinnitus, obtained relief. JOHN F. DELPH, M.D.

NOSE AND SINUSES

Daley, J.: The Role of Columellar and Septocolumellar Sutures in Rhinoplasty. *Arch. Otolar.*, Chic., 1947, 45: 178.

Daley states that 90 per cent of all artistic errors in rhinoplasty are centered around the nasal tip, involving the columella, nostrils, septolabial angle, and philtrum. He discusses the method of using various columellar and septocolumellar sutures and describes the indications for its use in detail. Sutures should be under as little tension as possible to prevent distortion of the neighboring tissues. The orthopedic suture of Joseph which is used to accomplish elevation of the tip and columella of the nose is most successful when a small "bite" of the columella not including cartilage is taken. A columella belly suture is recommended to prevent tightening and to keep the columella bowed caudally when the orthopedic suture is used. A ventral septocolumellar suture is recommended to elevate only the tip of the nose for correction of "polly beak." The straight columellar suture is used for closure of the crura of the columella. The perforating suture facilitates implantation of cartilage into the columella through the incision in the membranous septum and permits the cartilage to be maintained in position until manipulations have been completed, after which the suture is removed. JOHN R. LINDSAY, M.D.

Gatewood, W. L.: Substitution of the Chisel for the Saw in Reconstructive Surgery of the Nose. *Plast. Reconstr. Surg.*, 1947, 2: 149.

This writer believes that the use of the chisel over that of the saw is of advantage in the operation for

reconstruction of the oversized nose. The advantages are summed up as follows:

1. There is definite saving of time and energy.
2. The severed bone surfaces are left smooth and clear.
3. There is less trauma to the soft tissues.
4. There is no bone dust to produce osteogenesis.

A description of the operative procedure is given and 18 drawings are included to illustrate the operation. WILLIAM A. AHROON, M.D.

MOUTH

Kanthak, F. F., and Dubrul, E. L.: The Immediate Repair of War Wounds of the Face. *Plast. Reconstr. Surg.*, 1947, 2: 110.

During time of war the problem of immediate or delayed closure of soft tissue wounds assumes greater importance. The authors present their experiences and conclusions reached after the immediate repair of over 450 war wounds of the face. Since gas gangrene and tetanus arising from injuries of the facial structures is virtually unknown it is considered much safer to close wounds of this region immediately. In the early months of the war, authorities were divided in their opinions on how to best treat war wounds of the face, but in general the instructions admonished one to debride sparingly, to suture skin to mucous membrane where tissue loss existed, and not to repair facial wounds early, but to allow them to granulate first and then do a secondary repair. The objections to the delayed suture of facial wounds are that in addition to the increased danger of secondary hemorrhage the convalescence of the patient is lengthened and he is not ready for transport so soon as would otherwise be possible. The functional and cosmetic results produced by delayed treatment are not superior to those of primary repair and the discomfort of the patient with a partial loss of a cheek or lip is increased by delay in repair.

The repair of these wounds was done usually within 48 hours after injury. This delay was due to problems in transportation and limited operative facilities. In general, endotracheal anesthesia was used for severe injuries involving the oral or nasal cavities. The bony injuries are repaired first because of the ease of access. Large fragments are repositioned, those pieces having attachment being retained; other pieces are removed. Broken teeth are extracted. Apparatus is installed on the teeth remaining at this time for fixation of the fractures. Gauze packing is utilized for the thin bones of the middle third of the face, to mold them into position. After the bony injuries have been treated the soft tissue is attended to. The margins are trimmed of devitalized tissue, the débridement being extended to an area of good viability. The mucosal and muscular layers are first closed separately. The mucosa is sutured with interrupted stitches of fine silk, the knots being tied on the oral surface to expedite suture removal. The muscular layer is joined by interrupted stitches of 4-0 chromic catgut or fine silk. It is believed that closure of the wound in layers is important to produce dispersion of the scar and therefore minimal subsequent contraction of the sutured area.

The skin defect is closed with sliding flaps, rotation flaps, or interpolated flaps of skin and subcutaneous tissue, or, more rarely, by the use of the free skin graft which serves primarily as a physiologic dressing restricting the full development of contractions. In closure of the skin, the tension is relieved from the cutaneous margins by generous undercutting and by the use of fine white silk or 4-0 plain catgut passed through the deep layers of the skin. The skin itself is sutured either with fine black silk or fine nylon. Closure of the skin defect by these methods usually places the skin suture line in a different plane than that of the deeper layers, an important protection against contraction of the healing wound in a deforming manner. Whenever possible, small interpolated flaps of skin and subcutaneous tissue are utilized in closure to avoid contracting pulls in straight lines.

All wounds communicating with the oral or respiratory cavities are drained at one or more dependent points by means of rubber tissue. The wound is dressed with a single layer of fine mesh gauze and several moist dressings to absorb any immediate bloody ooze. Over these are laid a number of gauze dressings and, finally, an elastic cotton bandage is applied over all..

Not over 2 per cent of facial injuries required tracheotomy. Repositioning of the fractured jaws with adequate fixation and the use of adequate pressure dressings to minimize postoperative swelling kept the incidence of respiratory difficulties at a low level. By these procedures the patient is made more comfortable, requires less nursing care, and can be transported earlier than would be possible by delayed treatment. FRANK F. KANTHAK, M.D.

New, G. B.: Congenital Cysts of the Tongue, the Floor of the Mouth, the Pharynx, and the Larynx. *Arch. Otolar.*, Chic., 1947, 45: 145.

Congenital cysts of the tongue, floor of the mouth, pharynx, and larynx are rare but are particularly interesting because of the difficulty in their diagnosis and the problem of their complete removal. The patient may complain of repeated flare-ups due to infection of some part of the tongue, pharynx, or larynx. At the time of such flare-ups, the cyst may rupture and some fluid may be discharged into the mouth or throat, but at the time of the examination shortly after the discharge of the fluid, little or nothing can be found to account for the symptoms. One must consider an infected congenital cyst as a possible cause. At times one sees patients who have had such symptoms many years without a diagnosis having been made. Congenital cysts that are not infected may produce no symptoms other than those due to their increase in size.

The term "ranula" has been used to designate any cyst of the anterior part of the floor of the mouth; it should be used only to designate the thin walled,

epithelial lined cysts that grow slowly, are sometimes of a bluish tinge, and are soft and easily compressible. These cysts fluctuate but do not pit on pressure. They may be present at birth or may appear shortly afterward. They are readily distinguished from a dermoid cyst because of the thinness of their walls. There is no urgency about removal of a ranula unless it is causing difficulty in breathing or eating due to displacement of the tongue. Complete removal of the cyst is the treatment of choice. As the wall of the cyst is very thin, dissection must be carried out very carefully in order to remove all of the lining. The larger cysts may be opened and the lining destroyed by superficial surgical diathermy.

A cystic hygroma is a multilocular lymph cyst which usually occurs primarily in the neck but may involve the floor of the mouth. A cystic hygroma usually is found in the floor of the mouth or in the submental or submaxillary region. These cysts are multilocular lymph cysts. They have thin walls and an endothelial lining; they usually are filled with clear lymph. They are retention cysts due to obstruction or lack of development of the afferent lymph vessels. Examination discloses a smooth thin cyst in the floor of the mouth, which causes bulging of the tongue. Palpation of the neck reveals an enlargement on one or both sides. Surgical removal is satisfactory if the patient can stand the operation. At the Mayo Clinic, however, they have treated nearly all of these cysts with external irradiation or radon seeds.

A dermoid cyst which involves the floor of the mouth and the submental and submaxillary regions may be situated either above or below the mylohyoid muscle, or may extend from one region to the other through the muscle. The large cysts cause bulging of the floor of the mouth. The tongue may be back against the pharynx and may not be visible; the submental region may be filled out like a large orange. They may occur in infants and interfere with breathing and deglutition. In the differential diagnosis of the dermoid cysts, one must think of enlargement of the sublingual or submaxillary glands and of a salivary calculus. Complete removal of a dermoid cyst is advisable and the approach should be made either externally or through the floor of the mouth, according to the location of the largest part of the cyst. If the cyst is to be removed through the floor of the mouth, an incision is made over the tumor and, after the wall is exposed and a line of cleavage is established, the cyst may be removed by blunt or finger dissection. Even cysts which have extended submentally may be pulled up through the muscle and removed through the mouth. Cysts that are situated in the submental region and have not extended very far into the floor of the mouth or are badly infected are best removed externally through a submental incision.

Aberrant thyroglossal cysts may cause repeated inflammatory swelling of the base of the tongue if they become infected. If a portion of the cyst remains below the hyoid bone, it produces swelling in the neck or a thyroglossal sinus externally in the midline. If there is incomplete obliteration of a thyroglossal duct and a portion remains in the region of the foramen cecum, repeated infection may cause a great deal of trouble. The treatment of this lesion consists of removal of the cyst or cystic tract in the interval between infections.

Branchial cysts may be present laterally in the pharynx in the region of the posterior pillar, or below the tonsil, or in the hypopharynx and at the base of the tongue. The opening of the branchial cysts may be enlarged under suspension laryngoscopy and the cystic tract destroyed by surgical diathermy with a protected point. A congenital cyst of the larynx or a branchial cyst which extends laterally in the region of the vallecula may be removed under suspension laryngoscopy by surgical diathermy.

Congenital cysts of the larynx may not produce symptoms until adult life or may cause death because of laryngeal obstruction by the mass present at the base of the epiglottis and side of the larynx. Lateral thyrotomy, division of the thyroid cartilage and dissection of the cyst with a cotton applicator without exposing the larynx itself, has proved to be a very satisfactory operation for complete removal of these cysts.

Sharp, G. S., and Spickerman, H. D.: Cancer of the Tongue. *Am. J. Roentg.*, 1947, 57: 181.

The authors report 5 year cures in 31.3 per cent of 81 cases of carcinoma of the tongue treated by roentgen therapy combined with interstitial radium therapy. Excessive smoking and dental trauma to the tongue were considered common etiologic factors. Lingual carcinoma was found to metastasize and infiltrate early. Immediate biopsy and initiation of irradiation was considered important.

The number of 5 year cures was found to vary with the location, decreasing progressively in the following order: tip, borders, dorsum, and base. The more adult type of epitheliomas occurred at the tip, and the anaplastic, high grade, embryonal cell type occurred at the base. Over 90 per cent of all the cases were epidermoid carcinomas.

The authors believed that dissemination of carcinoma cells due to infection was prevented by treatment with penicillin and sulfa drugs. The primary lesion was treated exclusively by irradiation combining x-ray therapy with the subsequent implantation of radium needles. Whenever possible roentgen therapy was given through the mouth; however, for lesions at the base of the tongue supplementary external radiation was necessary. By using a short target-skin distance the total dose of roentgen therapy given by the method described varied from 4,000 to 4,800 roentgens given in from 10 to 12 days. Subsequent radium needle therapy was given in the average total dose of 1,200 mgm. hr. to the anterior two-thirds of the tongue and of 800 mgm. hr. to the base of the tongue. Soft tissue breakdown and osteonecrosis was minimized by this method.

JOHN R. LINDSAY, M.D.

Klein, D.: Classification of Maxillofacial Injuries. *Plast. Reconstr. Surg.*, 1947, 2: 133.

The author reviews a series of cases of maxillofacial injuries admitted to an evacuation hospital.

A plan of care was evolved in which evaluation of the injuries and classification of the varying degrees of such injuries were made. This plan made possible more accurate diagnosis, and a better approach to treatment and prognosis. The application of these findings to civilian practice has been noted by the author.

Because of the wide variation in the extent of the injuries and problems involved in caring for the patients, group classifications were made:

Group 1. Primary maxillofacial injuries
- (a) Without hemorrhage or obstruction
- (b) With (1) hemorrhage, (2) obstruction, or (3) both

Group 2. Maxillofacial injuries with concomitant wounds

The patients in group 1 a were usually comfortable, with little need of sedation, and they exhibited few, if any, signs of clinical shock regardless of the severity of the injuries. Extensive primary repairs were well tolerated.

The patients in group 1 b suffered, in addition, from noticeable loss of blood, respiratory obstruction, or both; they were acutely ill and presented many manifestations of clinical shock.

Treatment was directed to replacement of the lost blood and the establishment of an adequate airway. When these criteria were met, primary reparative surgery of any degree was carried out as in the first group.

In Group 2, with facial injuries and concomitant cerebral, thoracic, abdominal, or extremity injury, treatment of the facial injuries was carried out currently with that of the other injuries in the belief that recovery was not compromised and minimal scarring and deformity were the result. The principles of immediate reparative surgery or early repair were adhered to and emphasized, and particular attention was paid to patients developing unexpected signs and symptoms. Concealed injuries were suspected in these cases.

Excellent case histories illustrate the course and treatment of the cases in each classification; the medical, surgical, and mechanical data are complete.

FREDERICK W. MERRIFIELD, M.D., D.D.S.

PHARYNX

Révész, G.: The Role of Mechanical and Anatomical Factors in the Problem of Tonsillar Foci. *J. Lar. Otol.*, Lond., 1946, 61: 299.

Révész believes that the anatomical location of the palatine tonsil between the superior constrictor laterally, palatoglossus anteriorly, palatopharyngeus posteriorly, and tongue inferiorly renders it susceptible to pressure or massage during swallowing. He found on experimentation that radiopaque material was more slowly expressed from the crypts of deep seated tonsils during deglutition. From this observation he reasons that the products of bacterial action, when present, are expressed into the oral cavity from superficially situated tonsils, but toward the capsule from those deeply seated. The central pressure tension exerted by these muscles, mainly those in the pillars, is calculated to be about 0.45 kgm./cm.^{2}

These findings are advanced in support of his contention that improvement is more frequent following the removal of deep seated tonsils when one is seeking to eliminate foci of infection.

JOHN R. LINDSAY, M.D.

Figi, F. A.: Cicatricial Stenosis of the Nasopharynx; Correction by Means of a Skin Graft. *Plast. Reconstr. Surg.*, 1947, 2: 97.

Thirty-seven cases of cicatricial stenosis of the nasopharynx have been encountered at the Mayo Clinic. Many authors have stated that syphilis is the most common cause of cicatricial stenosis of the nasopharynx. This is decidedly in contrast to the findings in the cases observed by the author. Excessive trauma inflicted during tonsillectomy alone or combined with adenoidectomy induced the stenosis in 20 (54 per cent) of the 37 cases. Syphilis was causative in 8 (21 per cent) cases, an indeterminate inflammatory process in 3, rhinoscleroma in 2, a caustic burn with sulfuric acid in 1, diphtheria in 1, lupus in 1, and an attempt at surgical correction of a congenital malformation of the throat in 1. The duration of the stenosis at the time these patients came for consideration varied greatly. Narrowing of the nasopharynx in these cases may range from slight asymptomatic contracture to complete closure. The symptoms of stenosis of the nasopharynx are essentially those of nasal obstruction, and commonly are referred to the accessory sinuses and to the ears. They are dependent to a great extent on the degree of stenosis. Attempts have been made to reline the nasopharyngeal lumen by means of a skin graft, but usually these have failed because the graft was inadequately immobilized.

In the following case an acrylic obturator was used and an excellent result was secured.

The patient, a housewife, aged 50 years, came to the clinic for treatment on September 16, 1946 because of nasal obstruction of 11 years' duration. She had undergone tonsillectomy in 1932 and the wound had failed to heal. At that time results of serologic tests for syphilis were positive.

Examination of the patient at the clinic revealed dense cicatricial atresia of the nasopharynx, complete destruction of the uvula, and extensive scarring of the entire posterior and lateral walls of the pharynx. No other clinical signs of syphilis were observed. On serologic examination reaction to the Kline test was doubtful, results of the Kahn test were negative, and results of the Hinton and Kolmer tests were positive. Examination of the cerebrospinal fluid gave completely negative results.

Antisyphilitic treatment with penicillin was begun and 5 days later surgical correction of the atresia of

the nasopharynx was undertaken. Local anesthesia was used. The tip of a heavy curved probe inserted through either nostril into the nasopharynx was barely palpable through the densely scarred palate but it was possible, by use of the probe, to determine the approximate level of the reflection of the mucous membrane on the posterior wall of the nasopharynx and the superior surface of the soft palate. A transverse incision, approximately 4 cm. in length, was made across the posterior wall of the pharynx below the lower border of the scarred attachment of the soft palate to the posterior wall of the oropharynx. This was carried entirely through the thickness of the scarring and was then extended upward in order to free the palate widely from its attachment to the posterior pharyngeal wall. The opening thus created was enlarged sufficiently to permit insertion of the index finger through it into both choanae. A sponge rubber mold through which two rubber tubes had been inserted for nasal breathing was then covered with a split-skin graft of medium thickness. The graft had previously been taken from the anterior abdominal wall. This graft was drawn up into the restored nasopharyngeal lumen by means of two heavy silk ligatures attached to its upper surface and brought out through the nostrils. Although the sponge rubber mold was of such size and shape as to be self-retaining, supplementary anchorage was deemed advisable and was secured by tying together the traction ligatures, mentioned previously, below the columella over a small rubber tube. In addition the edge of the palate and the pharyngeal incision were sutured directly to the skin graft and the mold supporting it.

Treatment with penicillin was continued postoperatively and the patient's convalescence was uneventful. The mold was removed for inspection of the graft on the tenth day. Complete take of the graft had been obtained. At the end of two weeks the sponge rubber mold was replaced with a self-retaining acrylic obturator and the patient was dismissed from the hospital. The obturator was taken out for cleansing on alternate days and was worn for approximately 2 weeks.

The patient was dismissed from the clinic on the thirty-third postoperative day. At that time the nasopharyngeal lumen measured approximately 1.5 cm. and had shown no tendency to contract since removal of the obturator a week previously.

NECK

Robertson, J. D.: Thyrotoxicosis as a Surgical Problem. *Brit. J. Surg.*, 1946, 34: 194.

The author presents a review of the literature and of his personal experience with iodine in the pre- and postoperative care of patients with hyperthyroidism. His work is divided into three sections, namely:

1. Iodine and iodide dosage in thyrotoxicosis, and its effect on the basal metabolism as a guide to operation. The preoperative use of iodine reduced the operative mortality for thyroidectomy in thyrotoxicosis to less than 1 per cent. The mechanism of action of iodine on the hyperplastic thyroid is obscure, but it seems clear that iodide, free iodine, tincture of iodine, a strong solution of iodine (Lugol's solution), and calcium iodobehenate are equally effective on the basis of total iodine, and that approximately 200 mgm. of iodine should be administered daily (by mouth). The common practice of giving iodine routinely for 10 days before operation is not approved by the author, who showed that the basal metabolic rate often remains high for longer than 10 days after instituting iodine administration; some patients become refractory to iodine and the metabolic rate rises then, in spite of iodine administration. In such cases iodine should be withheld for several weeks; then, usually on starting iodine therapy again, the metabolic rate falls to normal. Usually the pulse rate changes parallel those of the basal metabolic rate. Robertson states that the basal metabolic rate is the best guide for choosing the time for surgery.

2. The postoperative reaction after subtotal thyroidectomy for the relief of thyrotoxicosis. There is almost always an elevation of temperature for 2 or 3 days after thyroidectomy. That this is due to surgical trauma, and not to the liberation of thyroid hormone or any toxic substance specific to toxic goiter, is shown by the fact that the same degree of temperature increase occurs after removal of nontoxic adenomas, of secondary glands of the neck, or of a chronically inflamed appendix. Blood pressure changes are also shown to be the same for different types of operation, and are not due to the type of anesthetic used.

3. The effects of iodine medication after subtotal thyroidectomy for thyrotoxicosis. Opinion varies concerning the value of iodine administration after thyroidectomy. The author compared a group of patients who received iodine both before and following operation with a group of patients who received iodine only preoperatively. On the average, the preoperative basal metabolism of the second group (no postoperative iodine) was higher, but normal metabolism was reached at about the same time postoperatively by both groups. Robertson therefore concludes that there is no value in the administration of iodine after subtotal thyroidectomy for hyperthyroidism. Finally he states that if iodine is not continued after subtotal thyroidectomy, it is possible to state by the twelfth day after operation whether the thyrotoxicosis has been relieved. If the basal metabolism on the twelfth day after operation is higher than the lowest preoperative level or above normal limits, then the thyrotoxicosis has not been relieved. The basal metabolism is a more sensitive index of an unsuccessful operation for the relief of thyrotoxicosis than the pulse rate, the weight, or the clinical symptoms.

CLINTON H. THIENES, M.D.

Reveno, W. S.: Propylthiouracil in Thyrotoxicosis. *J. Am. M. Ass.*, 1947, 133: 1190.

The author reports his observations on 54 patients with thyrotoxicosis, who were treated with propyl-

thiouracil, a thiouracil derivative. The antithyroid action of propylthiouracil in rats is approximately ten times that of thiouracil, and while it is more toxic than the latter, on a weight basis, it is less toxic in quantities having a comparable therapeutic effect.

Clinical observations on the first 52 patients treated with propylthiouracil indicated that 50 to 75 mgm. of propylthiouracil a day is an adequate initial dose, and 25 to 50 mgm. a day is an adequate maintenance dose. The antithyroid action is less intense than that of thiouracil; myxedema and thyroid enlargement have occurred only infrequently, and side reactions, not at all. This study gives the impression that propylthiouracil has about five times the activity of thiouracil, with few if any of the disadvantages presented by the latter.

Of the 54 patients treated with propylthiouracil during a period of 4 months, 18 had not received previous treatment. Of these 18 patients, 13 had toxic nodular goiter and 5 had toxic diffuse goiter. Thirty-seven patients still on varying maintenance doses of thiouracil were given the new agent instead. Of these, 22 had toxic nodular goiter and 14 had toxic diffuse goiter. Five patients who were unable to take thiouracil because of drug fever or urticaria were also included in this study.

In the group of previously untreated patients with thyrotoxicosis, 10 responded with an abatement of symptoms, gain in weight and a return of the basal metabolic rate to normal within 4 weeks on a dosage of propylthiouracil ranging from 50 to 150 mgm. a day. One patient responded after 11 weeks' treatment, and in 1, drug fever developed after a period of 41 days. Five patients showed varying degrees of response, just short of complete control because of too low dosage.

Thirty-six patients on maintenance doses of thiouracil were given propylthiouracil instead. The disease in 23 patients continued under satisfactory control while that of 13 was not controlled as well, again because of too low dosage. Apparently it takes at least 32 mgm. of propylthiouracil to match the effect of 100 mgm. of thiouracil, which would make the potency of propylthiouracil three times that of thiouracil. An effective initial dosage comparable to 400 to 600 mgm. of thiouracil should accordingly be 120 to 190 mgm. of propylthiouracil daily.

In 1 patient typical drug fever developed with propylthiouracil, but no other toxic reactions appeared. The five patients unable to take thiouracil because of toxic reactions tolerated propylthiouracil without toxic reactions.

Evidence of a toxic effect on the blood, or the blood forming tissues, has not been noted in the present series of patients. Blood counts were performed every week at first, then every 2 to 4 weeks. In no instance was there leukopenia, granulocytopenia, or anemia.

Propylthiouracil is a potent antithyroid agent fully as effective and much safer than thiouracil, although it too is capable of producing a toxic reaction, as has been demonstrated. JOHN H. MOHARDT, M.D.

Himsworth, H. P., Morgans, M. E., and Trotter, W. R.: Thyroidectomy and Thiouracil in Toxic Goiter; An Interim Comparison. *Lancet*, Lond., 1947, 1: 241.

Subtotal thyroidectomy may be performed on the thyrotoxic patient as soon as he shows sufficient improvement in his condition from thiouracil therapy.

Ninety-one cases of toxic goiter were treated with thiouracil or methyl thiouracil. In 12 cases operation was decided upon at the initial examination. In these cases thiouracil was used solely to prepare the patient for the operation. In another 13 cases, the drug had to be discontinued because of toxic effects, and 1 other patient died of a coronary thrombosis during treatment.

A total of 65 cases of toxic goiter were treated with the thiouracil drugs. These cases were compared with a similar series of 93 cases treated by subtotal thyroidectomy. The pulse rate and basal metabolism rate both showed reduction during the first 3 weeks, and there was a great similarity in this reduction due to both subtotal thyroidectomy and thiouracil. There was no appreciable difference in the condition of the patients treated with thiouracil and of those treated by subtotal throidectomy.

The authors state that the mortality from thiouracil is less than the overall mortality from subtotal thyroidectomy. They state, however, that thyroidectomy is advisable when tracheal obstruction is present, when a drug reaction occurs, and when the patient is unable or unwilling to attend regularly for review for an indefinite period.

Of 25 patients in whom the administration of thiouracil was stopped, 7 had a relapse, but there was no relapse in 13 who had been under treatment for a year or longer. In the group as a whole, the longer patients were followed after the cessation of treatment, the more frequently did relapse occur.

RICHARD J. BENNETT, JR., M.D.

Vander Laan, W. P., and Swenson, O.: The Results of Surgical Treatment in Graves' Disease. *N. England J. M.*, 1947, 236: 236.

In view of the many discussions regarding the relative merits of medical and surgical therapy in the treatment of hyperthyroidism, the authors have studied 149 cases surgically treated at the Peter Bent Brigham Hospital in Boston, Massachusetts, from 1933 to 1940. Nineteen patients whose conditions were satisfactory at discharge failed to report back to the clinic; therefore, the analysis pertains to 130 whose conditions were studied for a minimum of 6 months.

Eighteen patients had hypothyroidism after thyroidectomy, 9 suffered only mild hypothyroidism, and 9 had classic signs of myxedema. Of the latter, 7 had metabolic rates ranging from -31 to -47 per cent. All 18 were given thyroid with satisfactory results.

Seven patients had unilateral vocal cord paralysis immediately after surgery. In 1 case, it occurred after a hemithyroidectomy, and the patient refused

the second stage of the operation. The 6 other patients suffered only a temporary paralysis.

Four patients showed hypoparathyroidism. In 1 there was evidence of permanent parathyroprivia. Tetany was produced preoperatively by hyperventilation. It was symptomatically controlled with vitamin D. Symptoms disappeared spontaneously after a few months in the 3 other patients.

Thirteen patients showed persistent exophthalmos. The Naffziger operation was performed on 1 who showed a progression of exophthalmos. Of the remaining 12 patients, 2 showed marked exophthalmos.

Six patients had a recurrent thyrotoxicosis from 8 months to 4 years after surgery. Two were successfully treated with iodine. Two were reoperated upon; in 1 the result was successful but the other patient failed to return to the clinic. The remaining 2 cases were not studied.

Five patients had a persistence of the disease after surgery. Two were sent to radiologists. Two could not be followed up. The fifth patient was operated upon 3 times and made a complete recovery after the third operation.

Four patients died as a result of surgery. Two had a postoperative thyroid crisis, and 1 had hemorrhage into the wound with cessation of respiration. The fourth fatality occurred in a woman who refused further treatment after a response to iodine. She continued taking iodine for 10 months after discharge. She was readmitted and iodine was withheld for 3 weeks. When it was again administered, she failed to respond. She died on the operating table.

One hundred and thirty patients were followed up for more than 6 months. One hundred and thirteen patients, or 87 per cent, had a satisfactory outcome; 17, or 13 per cent, had either recurrence, persistence, parathyroprivia, or vocal cord paralysis, and some died, all of the results being considered unsatisfactory.

DANIEL RUGE, M.D.

Puppel, I. D., LeBlond, C. P., and Curtis, G. M.: The Surgical Therapeutic Significance of the Functional Behavior of Thyroid Nodules. *Ann. Surg.*, 1947, 125: 257.

The quantitative relations of thyroxin iodine, diiodotyrosine iodine, and inorganic iodine of excised thyroid tissue were determined, both for radioactive iodine and ordinary iodine.

The tissues were obtained at operation on 7 patients. There were 2 cases of nontoxic diffuse colloid goiter, one of which also exhibited a fetal adenoma, 2 cases of nontoxic nodular goiter, 1 case of exophthalmic goiter with 3 small colloid nodules, 1 case of nodular goiter with mild hypothyroidism, and 1 case of mildly toxic nodular goiter. In all of these the nodules exhibited a similar reaction to ordinary and radioactive iodine; the nodules showed less uptake of iodine than the surrounding thyroid tissue, and manufactured less thyroxin and diiodotyrosine from the administered iodine than did the paranodular thyroid tissue. Diffuse colloid thyroid tissue showed considerable "avidity" for administered iodine, but not much increase in production of thyroxin and diiodotyrosine. Diffuse hyperplastic tissue of exophthalmic goiter exhibited the greatest "avidity" for iodine and the greatest ability to produce thyroxin and diiodotyrosine. The question was raised as to whether the toxic manifestations in toxic nodular goiter are due to the nodules or to the paranodular tissue.

CLINTON H. THIENES, M.D.

Outerbridge, R. E.: Malignant Adenoma of the Thyroid, with Secondary Metastases to Bone. *Ann. Surg.*, 1947, 125: 282.

The present report is concerned chiefly with 5 cases of malignant adenoma of the thyroid with metastases to bone, seen at the Toronto General Hospital (Canada). In the last 20 years 2,268 thyroidectomies were performed at this hospital. Sixty (2.6%) were done for carcinoma of the thyroid. Of these, 24 were diagnosed as adenocarcinoma or malignant adenoma of the thyroid. The 5 cases referred to presented similar metastases to bone, the symptoms first directing attention to the secondary tumor rather than to the lesion in the thyroid, and biopsy of this tumor showed that it was composed histologically of apparently quite benign thyroid tissue.

Case 1. A male, aged 42, had an 18 months' history of a hard, painless lump the size of an olive in front of the right ear. This increased in size, and on admission he had a large pulsatile swelling, the size of half an egg, involving the right zygoma, a similar mass involving the fifth rib in the anterior axillary line, and a third pulsating mass over the second lumbar vertebra. A small nodule the size of a bean was felt in the right lobe of the thyroid. There was no evidence of hyperthyroidism.

Biopsy of the tumor in the right zygoma proved it to be an extremely cellular mass, which reproduced fairly typical thyroid acini filled with colloidal material in some sections. Other sections revealed cuboidal cells growing in small compact pseudoacinar arrangement and in cylindrical cords. There was blood vessel invasion, as well as atypical characteristics of the cells.

A right thyroid lobectomy was done; the lobe contained two nodules; (the left thyroid did not appear to be involved). The nodules presented the same characteristics as the metastases. Deep roentgen therapy was begun 1 month after admission, and 9 months later the patient presented metastases in the first and fourth lumbar vertebrae, the left pubic bone, and right wing of the ilium. Approximately two years later he was admitted because of large metastasis involving his left femur. He subsequently developed a spastic paraplegia and cord bladder, and died just 5 years after the onset of his trouble. Postmortem examination presented rather widespread metastases by more or less discrete growths which had shown little tendency to invasion of the surrounding tissues.

Case 2. A female, aged 73, entered the hospital with the history of a tumor of eight months' duration and of increasing size in the left parietal region.

On admission, the tumor was found to be a firm, painless nodule the size of a walnut lying deep to the skin and attached to the bone. The roentgenogram showed a punched out decalcified area about 1.5 cm. in diameter. Her thyroid contained two small, firm, painless nodules. The tumor of the skull was removed with the surrounding bone, and on microscopic examination revealed typical benign thyroid tissue.

Case 3. A female, aged 41, was admitted with a 3 year history of occasional pain down the right forearm and wrist, noted chiefly on movements of supination. One and one-half years before admission she had struck her right forearm, and following this she noticed the gradual development of a lump. On admission, there was a firm, pulsating, slightly tender mass, the size of an orange, involving the upper and outer aspect of the right forearm. X-ray films showed involvement of the upper one-quarter of the right radius, with the exception of the head and one-half inch of the neck. There was complete destruction of the shaft of the bone, leaving normal bone at each end. Biopsy revealed connected cords of acidophilic cells grouped in alveolar formation and containing colloid, a typical picture of benign metastasizing tissue.

There was no evidence of hyperthyroidism, but there were two small palpable nodules in the right lobe of the thyroid gland. A subtotal thyroidectomy was done, at which time two adenomatous masses were found, one benign and the other malignant. Following this, the tumor of the radius was resected.

Case 4. A female, aged 67, was admitted with a history that following a fall 2 years previously, she noticed the gradual onset of weakness and numbness of both legs. On admission she had complete loss of motor power of both legs and loss of pain, touch, and sense of vibration below the xiphisternum level, and urinary retention. Roentgenograms revealed a tumor involving the fifth thoracic vertebra and the proximal portion of the posterior end of the fifth left rib. Laminectomy revealed a vascular tumor which, on microscopic examination, revealed thyroid tissue of benign appearance.

The right lobe of the thyroid was enlarged. The patient was given a total of 4 courses of deep roentgen therapy to the thyroid gland and to the area of the fifth thoracic spine in the following year. There appeared to be no change in the thyroid, but the neurologic status was improved.

Case 5. A female, aged 30, was admitted with a history of adolescent goiter at the age of 12. There was no increase in size until recently. A thyroidectomy was done because of pressure symptoms, and examination of the tissue demonstrated malignancy with invasion of blood vessels. Two months later the patient noted increasing weakness and numbness of both lower limbs, and examination showed an incomplete spastic paraplegia, paresthesia, and some sensory loss involving the lower portion of her trunk and lower limbs. Radiologic examination showed bone destruction of the seventh cervical and first thoracic vertebrae, and spinal puncture demonstrated complete block in this region. A cervical laminectomy was done, and since the lesion was so extensive only a biopsy was possible. This revealed a typical benign type of thyroid tissue. The patient was given a total of five series of teleradium to the region of the cervicodorsal spine. Gradual improvement resulted.

These cases illustrate the main features of the condition. Usually the patient first comes to the hospital because of symptoms produced by the bony tumors. Despite the benign appearance of the histopathology of these metastases, a malignant primary focus can always be found in the thyroid gland. This primary process is usually a well encapsulated adenoma which has become malignant. In the present series only 33 per cent of malignant adenomas had formed metastases by the time the primary growth was removed from the thyroid gland. Metastases from this type of tumor have a predisposition for the osseous system. The metastatic tumors have a tendency to invade bone by growing in an expansible manner and eroding the bony cortex, and the roentgenogram is suggestive of an osteolytic sarcoma or giant cell tumor. These bony metastases are frequently pulsatile and occasionally enlarge during menstruation and pregnancy.

Complete excision of the primary malignant adenoma and metastases would seem to be the most rapid and effective means of dealing with this problem. The effectiveness of this means of treatment depends on removal of both primary and secondary growths early, and the slow growth of this tumor is in the surgeon's favor. His cases suggest that a period of at least a year elapses after the formation of the first metastatic tumor before others begin to develop. Deep roentgen therapy seems to have found a definite place in the treatment of this condition.

A plea is made for the recognition of the gravity of these lesions which should be reflected by early, complete, and adequate treatment.

LEROY J. KLEINSASSER, M.D.

DeMoraes Grey, J.: A Study of Thyrolingual Vestigial Tissues (Conduta em face dos "vestigios" tirolinguais). *Rev. brasil. cir.*, 1947, 16: 31.

Aberrant goiter should be distinguished from so-called accessory, supernumerary, or "remanescent" goiter, the latter being confined to the triangle formed by the lower jaw and both carotid arteries. The author reports 4 cases of cysts and fistulas in the last mentioned region.

Accessory goiters must be considered as vestigial formations in the region of the thyroglossal canal. They may be divided into upper, or glossohyoid, and lower, or thyrohyoid, groups. The fistulous tract may lie behind or in front of the hyoid bone, or it may pierce it. A cure can be obtained only by complete excision of the tract. To facilitate the dissection, the hyoid bone should be resected. When the dissection is finished, the remaining portions of the hyoid bone are sutured with catgut. Injection of

methylene blue facilitates the visualization of the tract.

The operation can be performed under local anesthesia except in cases in which the goiter is located at the base of the tongue, when a general anesthesia with intratracheal intubation is preferable. Muscle tissue, aponeurosis, and hyoid bone must be sacrificed to accomplish complete excision of the tract. While resecting the hyoid bone, care should be taken to avoid the external carotid artery.

JOSEPH K. NARAT, M.D.

Lenz, M.: Cancer of the Larynx. *J. Am. M. Ass.*, 1947, 134: 117.

Of 110 patients who received roentgen therapy for carcinoma of the larynx during the period from 1931 to 1941, 27 per cent were free from clinical evidence of cancer for 5 to 14 years. The remaining 73 per cent were not cured; either cancer persisted, or radiation edema, radionecrosis, or metastases were present at death.

The principal factors influencing prognosis are (1) the local extent to which the larynx has been involved and (2) metastasis to the lymph nodes. When invasion of the arytenoid cartilage is incomplete, or there is no fixation, 50 per cent cures (for 5 to 14 years) are obtained; when there is complete fixation, only 12 per cent of the patients are free of cancer for periods of from 5 to 14 years. Among patients without clinically demonstrable metastatic lymph nodes, 33 per cent are cancer free after periods of from 5 to 14 years. Among those with metastasis when first seen, only 15 per cent are cancer free.

The microscopic classification of the cancer is of only slight prognostic significance since 37 per cent of both the well differentiated and the undifferentiated cancers are in the group of patients who are cancer free after from 5 to 14 years following roentgen treatment, while only 26 per cent of the moderately differentiated cancers are among the patients who remained cured after periods of 5 to 14 years.

Since the results following roentgen therapy in early cordal cancer compare favorably with those following laryngofissure and cordectomy, and roentgen therapy results in a much better voice than can be obtained with treatment by laryngofissure, roentgen therapy is recommended as the treatment of choice in early laryngeal cancer. Laryngectomy is the treatment of choice if there is complete fixation of the arytenoid cartilages. In cases of partial fixation, the author believes that a full course of roentgen therapy should be given and the decision for laryngectomy deferred for a period of about 3 months to determine if the treatment has eradicated the disease.

The usefulness of prophylactic postoperative roentgen therapy after laryngectomy is questionable. Radical neck dissection is advised if there are moveable clinically involved nodes, whether few or many. When any lymph nodes are fixed, irradiation (roentgen or interstitial) is recommended.

Roentgen therapy is also recommended for cancer of the epiglottis, ventricular band, and anterior parts of the aryepiglottic folds even after fixation of the arytenoids and lymph node metastases. Cancer of the piriform sinus responds poorly to roentgen therapy.

A modified Coutard technique is employed, with a reduced daily dose and irradiated area to conserve normal tissue resistance. An average dose of 5,700 to 7,000 roentgens is given at the rate of 100 roentgens to each side daily over a period of 5 or 6 weeks, through as small a field as possible, usually 6 by 8 cm., or smaller when possible.

FRANK B. QUEEN, M.D.

SURGERY OF THE NERVOUS SYSTEM

BRAIN AND ITS COVERINGS; CRANIAL NERVES

Friedland, F., and Margolin, R. J.: Physical Rehabilitation of Patients with Brain Injuries. *Occup. Ther. Rehabil.*, 1947, 26: 8.

The authors have had experience with over 80 patients at the Cushing General Hospital. All of the patients were suffering with major brain injuries which had produced varying degrees of the cerebral type of paralysis, as well as mental changes in some instances. It became obvious to the authors early in their work that the conventional forms of heat, massage, and passive exercise were alone not sufficiently effective to rehabilitate this difficult and entirely worthy group of patients. They found that it was necessary to teach posture, balance, co-ordination, and eventually ambulation, by special training which included re-education of *all* the muscles of the body.

The condition of some patients was such that individual attention was necessary, the treatments particularly beneficial to the special patient being administered by trained attendants. Gymnasium classes, including group exercises and games, constituted the other major portion of the rehabilitation program. In all training, not only was an attempt made to regain the use of weak, spastic muscles and stiff joints, but also to develop co-ordination in all movements. Ambulation, of course, is the main goal of the paralyzed patient, but even with the moderately good muscle strength that most such patients have, or can develop, they are helpless and without any feeling of security because of their poor co-ordination and defective sense of balance.

The patience and personal attention given this group of patients can be realized by the authors' descriptions of the various exercises, games, and devices used. The very fact that more than 75 per cent of the patients eventually became able to walk up and down stairs indicates the satisfying gains which can be accomplished by a carefully supervised rehabilitation program. JOHN MARTIN, M.D.

Asenjo, A., Perino, F. R., García, E., and Gallo, A.: A Hundred Cases of Tuberculoma of the Central Nervous System (Cien casos de tuberculomas del sistema nervioso central). *Rev. méd. Chile*, 1947, 75: 1.

Of the 2,415 neurosurgical patients observed from February 26, 1940 to June 31, 1945, 287 were diagnosed as having tumor of the central nervous system, and, of these, 100 (4.14 per cent) were harboring tuberculomas. Sixty-five of these patients were either operated upon or came to autopsy; the rest were diagnosed clinically. The ages of these patients ranged from 19 months to 58 years; and there was a predominance of the male sex among those with cerebellar localization and of the female sex among those with hemisphere localization. In nearly every case the living conditions had been poor; there was a history of anergic maladies (scarletina, measles, grip, frequent colds) in 58; and in 69 there was a concomitant tuberculous lesion elsewhere (pulmonary or pleural in 48).

A special study of the relationship between the pulmonary localization as a complication of the intracranial lesion was made in 35 patients. In 6 of these the lungs seemed to be without tuberculous involvement. However, the roentgenological examination in this study was unsatisfactory as the roentgenograms postulated a completely normal lung in 2 of 20 lungs which later proved to be tuberculous anatomically; and in 4 of 11, also proved to be tuberculous anatomically.

In 11 instances the neurologic manifestations were preceded for from 3 months to 3 years by pleurisy.

Some of the roentgenographic studies had been made weeks and even months before the death of the patient; however, it is possible that the pulmonary lesion found anatomically after death was the result of dissemination from the central nervous system lesion itself. All in all, however, the authors conclude that they are justified in assuming that in a large proportion of these unfortunates the nervous localization resulted from hematogenous dissemination of the tubercle bacillus from the pulmonary lesion.

In 38 patients the tuberculoma was single and in 27 multiple; in 42 the localization was cerebral (25 confirmed, 17 presumed), in 33 cerebellar (26 confirmed, 7 presumed), in 9 the brain stem was involved (5 confirmed, 1 presumed), and in 6 the lesions could not be definitely localized. In all cases the shape and progression of the lesion tended to be irregular and differed from that of the new growths in that initially the lesion was not space constricting but invasive, with tubercle bacilli identified as much as 2 cm. from the macroscopic borders of the lesion.

The histology is that usually described, except in that the proliferation of the microglia in early lesions is believed to have been described for the first time. This study of the astroglia, microglia, and connective tissue reaction was made in 8 cases by the method of Del Rio Hortega. Later, when the process did become of a space constricting nature, the manifestations of increased intracranial pressure tended to dominate the picture and constituted the chief indication for early surgical interference.

The operation chiefly indicated has, in the authors' experience, been a simple decompression, usually of the occipital region. Of course, an attempt might be made to remove the lesion en masse when 1.5 cm. of healthy tissue could be left on all sides. This possibility was present chiefly in tuberculomas of the cerebral hemispheres. In the cerebellar lesions there

were several disadvantages from the surgical standpoint. In the cerebellum the lesion does not tend to get well spontaneously by calcification as often as it does in the cerebral tuberculoma; there is more tendency to extend in all directions, that is, more tendency to produce a block in the circulation of the spinal fluid, and there is more tendency to extend to the meninges. In this localization removal of an entire lobe of the cerebellum may be attempted when the condition of the patient and the results to be expected would seem to justify the extensiveness of the procedure. For the tuberculomas of the brain stem little or nothing can be done. One may attempt an occasional decompression, or in selected cases the operation of Torkindsen.

As regards the prognosis, 57 of these patients have been discharged. Of these, 26 were operated upon and 31 were not. Of the operative patients, 3 were discharged in a very grave condition. Of the remaining 54, 2 are known to have died; of these 1 had been operated upon. Of the remaining 52, only 12 could be followed up subsequently. Of these 12, 4 had not been operated upon, and of these 4, 3 stated that their neurologic symptoms had ceased. The remaining patient retains a tendency toward convulsive seizures which, however, can be controlled by luminal. The remaining 8 patients had been operated upon. Of these, all report that their symptoms have entirely gone or, at least, diminished to a great extent.

Forty-three patients have died. Of these, 30 had been operated upon.

In general, the cause of death has been the evolution of the encephalic tuberculoma which frequently resulted in tuberculous meningitis. Occasionally, of course, this condition was complicated by the presence of lesions elsewhere in the body.

JOHN W. BRENNAN, M.D.

SPINAL CORD AND ITS COVERINGS

Munro, D.: The Rehabilitation of Patients Totally Paralyzed below the Waist, with Special Reference to Making Them Ambulatory and Capable of Earning Their Living. *N. England J. M.*, 1947, 236: 223.

In the present article, the management of the urinary system in anatomic and physiologic transections of the cord and cauda equina is clearly explained. The correct use of tidal drainage is the foundation of proper bladder training. Tidal drainage permits the bladder to be filled and emptied with control of the intravesical pressure and prevents puddling of residual urine and overstretching of the bladder. The use of tidal drainage centers about the type of bladder one has. This is determined by cystometrographic studies. Its action depends on the hydrodynamics of the siphon. Siphonage is activated whenever a predetermined intravesical pressure has been reached. An airtight siphon system must be maintained during emptying. The siphon is broken by admission of air when the bladder is empty. The apparatus is then in a condition which permits the cycle to start over again.

Adjustment of the siphon curve is very important and the stage of the bladder recovery should determine the height of the siphon curve. Bladders associated with injuries of the spinal cord or cauda equina pass through four stages. Immediately after injury, the bladder is atonic and the siphon curve should be 1 or 2 cm. above the bladder level. The curve should be set at 2 to 5 cm. above bladder level for the autonomous bladder, at 15 to 18 cm. for the hypertonic bladder, and at 10 to 12 cm. for the reflex or automatic bladder. The latter height should also be used in the normal bladder of a patient who is unconscious from a head injury.

The author states that in doing a cystometrogram, it is important to imitate the natural bladder in the rate of filling. One should fill it at increments of drops rather than increments of 50 c.c. He advises a rate of about 90 drops per minute. When cystometrograms are done carefully, lesions affecting the bladder are shown as follows:

A transection between C_4 and S_2 shows an immediate atony. The detrusor muscle does not contract at all. The internal sphincter closes tightly, and the external sphincter is relaxed. Any emptying is the result of leakage through the internal sphincter and occurs because of the elasticity of the bladder wall and not by any contraction. In the absence of spinal shock, infection, and hypoproteinemia, the bladder will proceed to the next stage, known as the autonomous stage, which is characterized by ineffective aborted emptying contractions. The detrusor muscle contracts and forces urine through the tight internal sphincter. It is called autonomous because it is believed that the neural control is in the intramural autonomous plexus. The next is the hypertonic stage. It is characterized by frequent contractions of the detrusor. The internal sphincter opens with each contraction and closes during the intervals. The external sphincter responds reflexly. The final stage is the reflex or automatic stage. The bladder empties completely with each emptying contraction and is deprived of all inhibitory influences. It is the best end-result that can be obtained in transecting lesions, but should not be considered the end-result in nontransecting injuries. In the latter, the patient has the ability to relax and contract the external sphincter.

Lesions that are complete and involve the sacral segments or roots, or which involve the parasympathetic plexuses and denervate the bladder, depend on the intramural plexus for neuromuscular control. In such cases the end-result is the autonomous bladder.

Wherever possible, activity should be of the reflex type. The bladder capacity should be at least 200 c.c. To prevent genitourinary infection, the fluid intake should be at least 3,600 c.c. per day. Bladder training is easier when the patient is ambulant, but should not wait because the patient is forced to be in bed. DANIEL RUGE, M.D.

PERIPHERAL NERVES

Telford, E. D., and Mottershead, S.: The "Costoclavicular Syndrome." *Brit. M. J.*, 1947, 1:325.

Although the syndrome arising from pressure on the subclavian or axillary artery and the accompanying brachial plexus as they pass from the thoracic inlet to the arm is fairly well known, consistent agreement as to the site and mechanism of the compression is lacking.

One hundred and twenty cases of this "costoclavicular" syndrome were analyzed with regard to their history and findings at operation. The causes varied: scoliosis of the cervicodorsal spine, bands from the scalenus medius to cervical ribs, and cervical ribs of varying sizes. In many instances, no definite etiology could be found. It was apparent from these patients that no one mechanical cause explained all the symptoms and findings.

A case history is presented of a 23 year old male with numbness and tingling when his left arm was depressed or "hanging down" at his side. Operation disclosed that the axillary artery was visibly compressed while in the symptomatic position by two heads of the median nerve.

Observations were made with regard to radial pulsation with the arms in various positions in normal individuals. Although decrease and obliteration of the pulse were noted in some individuals in various arm positions, the highest percentage of pulse changes was found when adduction against force was tested. Investigation was undertaken on the anatomical findings of the clavicular and axillary regions of cadavers with especial reference to the neurovascular bundle and its relations with the arm in a depressed position (as when hanging by the side), the retracted position (as with displacement of the shoulders posteriorly), and with abduction and adduction. Dissection revealed the believed explanation of symptoms.

Pulse alterations when the arm is in a depressed position are explained by compression of the axillary artery by heads of the median nerve which anatomically encircle the artery. When the arm is abducted these nerve cords do not cause pressure sufficient to stop the arterial flow, but the artery is occluded by edges of the subscapularis and the pectoralis minor muscles.

Interference with the brachial plexus involves different structures. With depression of the shoulder even the superior and middle plexus trunks are tightly stretched across the tendinous edge of the scalenus medius. When the arm is abducted or retracted the middle third of the clavicle pushes the plexus bundle backwards against the anterior border of the scalenus medius, and if resistance such as a cervical rib or abnormal first rib were present compression might easily occur.

It is believed that in the majority of patients suffering from the "costoclavicular syndrome" the plexus crosses a cervical rib, a tendinous band, an abnormal first rib, or the scalenus medius; symptoms are produced when the arm is depressed and are those from involvement of the lowest trunk. A smaller group has symptoms when the arm is retracted or abducted, believed to be due to interference of the entire plexus by the clavicle.

That the "costoclavicular" syndrome is caused by compression of the neurovascular bundle between the clavicle and the first rib is not supported by any anatomical evidence. C. Frederick Kittle, M.D.

Maróttoli, O.R.: Traumatic Paralysis from Traction of the Common Peroneal Nerve (Parálisis traumática por tracción del nervio ciático poplíteo externo). *Bol. Acad. argent. cir.*, 1946, 30: 1187.

Three clinical cases of peripheral paralysis of the common peroneal nerve are reported. In all the mechanism of trauma was the same, a traction injury of the nerve trunk; however, the etiology was different in each case. In one patient the immediate cause was a fall on the right side with a forced varus deformity of the right knee. In a second patient the cause was an aviation accident with prominence of the head of the peroneus and widening of the entire knee, with healing of the fracture of this joint. In both these patients the sensory and motor paralysis were immediate to the injury. In the remaining case, an injury to the femoral artery resulted in a huge hematoma of the corresponding thigh, with flexure spasms of the hip and knee joints and external rotation of the limb. The hematoma was evacuated at operation and the limb fastened down almost straight on a splint reaching from the hip to the ankle, and the next day the paralysis typical of this injury had developed. In 2 of these patients intraneural injections of iodipin afforded fairly reliable roentgenograms of the condition present; in the remaining case the roentgenograms proved entirely unreliable.

In the first of the cited cases the indurated, cicatricial section of the nerve over the peroneal head was excised and immediate nerve suture was done. The attempt apparently failed completely. In the 2 other patients the condition was more recent, the degenerative changes not so advanced and the nerve was simply elevated and brought forward so that the nerve trunk would not be under tension. In 1 instance the head of the peroneus muscle was resected with satisfactory recovery of function.

John W. Brennan, M.D.

MISCELLANEOUS

Kirklin, J. W., Chenoweth, A. I., and Murphey, F.: Causalgia. A Review of Its Characteristics, Diagnosis, and Treatment. *Surgery*, 1947, 21: 321.

The cases of 52 patients suffering from causalgia have been reviewed by the authors. They wish to define causalgia as "a clinical syndrome associated with a lesion of a peripheral nerve containing sensory fibers, manifested by pain in the affected extremity; this pain is usually of a burning character, and is usually located in an area corresponding in general

to the cutaneous distribution of the involved nerve. An integral characteristic of this pain, one whose presence is necessary in order to make the diagnosis, is its accentuation by certain disturbing features in the affected individual's environment."

The pathogenesis of causalgia is discussed, with the various theories advanced by previous observers. No satisfactory explanation has as yet been advanced to account for the phenomena.

A good many of the reported cases were explored surgically, but no difference in the pathological condition could be demonstrated in the patients with causalgia, as contrasted with other patients with peripheral nerve injuries who did not have this syndrome.

Microscopic sections were made of resected neuromas and gliomas, but failed to prove conclusively that causalgia exists only in incomplete anatomic lesions. From the clinical standpoint, the majority of patients exhibited evidence of an incomplete nerve lesion.

The various types of pain described by the patients have been analyzed, as well as the factors which tend to aggravate the discomfort.

Treatment has included neurolysis, which generally has been ineffective; periarterial sympathectomy is discussed, although it was not used in the present series.

The authors believe that the best method of treatment at this time is sympathectomy. In the case of the upper extremity, approach is made by removal of a portion of the third rib. The sympathetic trunk is sectioned below the third ganglion with division of the gray and white rami between the second and third ganglia in their respective intercostal nerves. The central stump of the sympathetic chain is then sutured into the intercostal muscles below the second rib.

In the case of the lower extremity, resection of the second and third lumbar ganglia with the intervening sympathetic chain has been employed. Preoperative procaine block of the sympathetic chain has been employed, but was not considered as essential in making the diagnosis nor in making the decision to employ sympathectomy.

The results have been tabulated according to the degree of relief as classified by the authors.

HOWARD A. BROWN, M.D.

SURGERY OF THE THORAX

CHEST WALL AND BREAST

Gaston, E. A.: Plasma Cell Mastitis. *Surgery*, 1947, 21: 208.

During the 15 years since it was first described, plasma cell mastitis has been a subject of increasing interest to surgeons and pathologists. That the disease is one of apparent rarity is attested by the fact that only 43 cases have been reported in the literature to date. The purpose of this communication is to call this disease to the attention of surgeons again, and to report 3 new cases, 1 of which presented unusual complications.

The term "plasma cell mastitis" was first used by Ewing to describe a benign inflammatory disease of the nonlactating breast. The first published report in which this term was used was presented by Cheatle and Cutler in 1941, and was based on cases observed at the Memorial Hospital for Cancer and Allied Diseases, New York, New York. Two years later Adair presented detailed reports of the 10 cases observed at the same institution up to that time. Since these preliminary reports a number of additional contributions have been made in the American literature.

The importance of plasma cell mastitis lies in the ease with which it may be confused with carcinoma. The disease occurs well within the age limits when carcinoma of the breast may be expected. In all published reports the disease has invariably occurred in multiparous women, and the interval since the last lactation has averaged from 4 to 5 years.

Adair has pointed out that the natural history of the disease may be divided into two phases, the acute and the residual. The acute phase consists of a mild inflammatory reaction involving all or a portion of the breast, often associated with increased local heat, redness, and mild tenderness. This phase is transient and the symptoms are usually so mild that the patient does not seek medical advice. After a variable period, ranging from a few weeks to several months, the residual phase, consisting of a nontender tumor, is noted. The tumor is at times accompanied by discharge from the nipple, which is variously described as watery, creamy or puriform. Nipple discharge was noted in 12 of the 34 reported cases in which these data were mentioned. In none of these cases has a bloody nipple discharge been noted, although in 1 case presented, such a bloody discharge was present for 5 months preceding operation.

Examination of the involved breast reveals a firm, nontender tumor mass, with an irregular and often ill defined border. The mass may occupy any portion of the breast, but usually it partially underlies the areola. The nipple is retracted and the overlying skin is edematous, which gives a typical peau d'orange appearance such as is seen in malignant lesions. The axillary lymph nodes are usually enlarged. Signs of local inflammation are entirely lacking.

The physical findings in plasma cell mastitis may so closely resemble those of carcinoma of the breast with attachment to the skin and with axillary metastases that many cases have been reported in which radical mastectomy was done without preliminary microscopic study of the biopsy material. The diagnosis may be suspected, clinically, by eliciting a satisfactory history of the mild, acute phase of the disease.

The gross pathologic lesion of plasma cell mastitis consists of single or multicentric nodules, usually of a yellowish brown color, occasionally with liquefaction, and forming abscesslike cavities.

On microscopic examination the most striking feature is the massive infiltration of the glandular and interstitial tissues with plasma cells. In some cases these are found in solid sheets, cords, and in round or ovoid masses. Foreign body giant cells are usually present, sometimes in great numbers, which makes the differential diagnosis from tuberculosis a matter of concern.

A diffuse overgrowth of periductal connective tissue often causes partial obliteration of the duct lumens and, by extending into the supporting tissue, accounts for the retraction of skin and nipple which is so commonly noted clinically. Dilated ducts are often filled with cellular debris desquamated from the lining epithelium. Plasma cell mastitis may be indistinguishable from plasma cell tumor of the breast.

From the clinical standpoint it would seem that such symptoms as tumor, nipple discharge, and skin and nipple retraction could be satisfactorily explained on the basis of epithelial hyperplasia and periductal fibrosis. Perhaps the only part of the clinical picture which might be attributed to the plasma cell reaction is the early acute phase described by Adair.

From the histologic standpoint it is well known that plasma cells are found in a great variety of disease processes in which they are considered important only as indicating the presence of an inflammatory process of long duration. Therefore, if the plasma cell reaction is merely incidental to some other pathologic process, the advisability of using the term plasma cell mastitis, which places stress on this secondary manifestation, is questioned. To overcome this nomenclatural disadvantage the suggestion has been made that plasma cell reaction be used as a suffix to point out this unusual tissue response and at the same time the pathologic condition which may have elicited it should be given. Thus, case 1 might be termed "glandular cystic hyperplasia with plasma cell reaction," or "chronic mastitis with plasma cell reaction," while case 2 could properly be termed "comedocarcinoma with plasma cell reaction."

In case 1 there was a sanguineous nipple discharge. In view of the marked hyperplasia of the epithelium lining the ducts, it seems probable that this symp-

tom will be encountered in only a small percentage of cases.

Case 2 is of particular importance because it illustrates the concomitant development of comedocarcinoma in a breast which was the site of a plasma cell reaction. While this is the first case that has come to the author's attention in which the two conditions coexisted, the epithelial hyperplasia noted by all authors suggests that such a combination is more than coincidence. This case, together with that reported by C. W. Cutler, in which the disease, or one microscopically identical with it, metastasized as a plasmacytoma, suggests that plasma cell mastitis, while usually a benign disease, has definite malignant potentialities which may develop in either, or possibly both, of two directions; (1) as a malignant epithelial neoplasm of the comedocarcinoma type, probably the result of dedifferentiation of the hyperplastic ductal epithelium; or (2) as a malignant plasmacytoma. In addition, Parsons, Henthorne, and Clark observed 2 cases in which local recurrence, without distant metastases, followed simple excision of the tumor mass.

These considerations would seem to clarify the problem of treatment. Biopsy and immediate microscopic examination of frozen section material should be carried out in all breast tumors, including those in which the clinical findings are characteristic of malignancy. When the diagnosis of plasma cell mastitis is established histologically, simple mastectomy would seem to be the operation of choice, at least until more is known of the etiology and natural history of the disease. Sections from many parts of the removed breast should then be carefully studied for evidence of malignancy. If such evidence is found, subsequent removal of the pectoral muscles and radical axillary dissection are, of course, indicated. Even though histologic evidence of malignancy is not found, careful follow up examinations for evidence of local or distant recurrence should be made for several years following the operation.

JOHN E. KIRKPATRICK, M.D.

TRACHEA, LUNGS, AND PLEURA

Miscall, L., and Harrison, A. W.: Thoracic Surgery in a Hospital Center. *Ann. Surg.*, 1947, 125: 311.

Thoracic injuries fall into two basic groups. Those in the first group demand immediate attention to save life, and present problems concerned with the control of hemorrhage and the re-establishment of cardiorespiratory function. Those in the second group do not threaten life immediately, and some delay in treatment is permissible. The problems they present involve the early maximal restoration of normal anatomic and physiologic relationships.

Operative and nonoperative measures are useful in both groups, but they are not mutually interchangeable. Conservative measures should be pushed to the limit when they will suffice. When they fail or are unsuitable, operative approach is indicated. Success will be greatest when familiarity with, and regard for principles govern the application of methods. A wider dissemination of the principles and possibilities of this field of surgery is needed.

SAMUEL KAHN, M.D.

HEART AND PERICARDIUM

Bing, R. J., Vandam, L. D., and Gray, F. D., Jr.: Physiological Studies in Congenital Heart Disease. Results of Preoperative Studies in Patients with the Tetralogy of Fallot. *Bull. Johns Hopkins Hosp.*, 1947, 80: 121.

The volume of blood flow through the pulmonary arteries was calculated in a total series of 120 patients with pulmonic stenosis, according to the following formula:

$$\frac{\text{CO}_2 \text{ output (ml. per min.)}}{\text{CO}_2 \text{ content of pulmonary artery (vol. per cent) minus } \text{CO}_2 \text{ content of pulmonary vein (vol. per cent).}} \times 100$$

In 36 of 48 consecutive studies, the flow through the pulmonary artery per square meter of body surface was below 3.00 liters per minute, which is the normal cardiac index. The systemic blood flow was calculated according to the following formula:

$$\frac{\text{O}_2 \text{ consumption (ml. per min.)}}{\text{O}_2 \text{ content of arterial blood (vol. per cent) minus } \text{O}_2 \text{ content of right auricular blood (vol. per cent)}} \times 100$$

per square meter of body surface. It showed marked variations above and below the values for the normal cardiac index. In 14 patients, the rate of flow in the systemic circulation was increased above normal standards. As a result of the increased rate of flow through the peripheral circulation, the differences between the oxygen and carbon dioxide contents of peripheral arterial and right auricular blood were below normal. In 9 individuals, the systemic blood flow approximated the standards for the cardiac index, whereas in 13, the systemic flow was below these standards.

A comparison of the data obtained for systemic flow with those obtained for the flow in the pulmonary artery showed that the former exceeded the latter by from 0 to 9.7 liters per minute. In the tetralogy of Fallot, therefore, some of the returning mixed venous blood, unable to pass through the stenosed pulmonary artery into the lung, courses through the interventricular septal defect and the overriding aorta directly into the systemic circulation. The over-all direction of the intracardiac shunt, therefore, was from right to left. However, there is some concomitant flow from left to right through the septal defect. This is shown by the observation that the oxygen content of right ventricular blood exceeded that of the right auricle in many cases. The variations in systemic flow in patients with the tetralogy of Fallot are related to the degree of pulmonary stenosis and the size of the intracardiac shunt.

The pulmonary capillary flow (total pulmonary flow) was calculated according to the formula:

$$\frac{\text{CO}_2 \text{ output (ml. per min.)}}{\text{CO}_2 \text{ content of blood reaching alveoli (vol. per cent) minus CO}_2 \text{ content of pulmonary vein blood (vol. per cent)}} \times 100$$

In most younger patients, the values obtained agreed closely with those determined for pulmonary artery flow. In most older patients, the pulmonary capillary flow exceeded the pulmonary artery flow, which indicated that the lungs received blood from sources other than the pulmonary artery. Direct observations of the collateral circulation during operation confirmed these findings. It is probable that the collateral circulation to the lung is an important factor in the physiological adjustment of these individuals to their abnormally low pulmonary artery flow.

Intracardiac and systemic blood pressures were obtained in a series of 22 patients with clinical and physiological evidence of the tetralogy of Fallot. The right intraventricular systolic pressure was elevated in 21. The pressures recorded ranged from 20 to 110 mm. above the normal values of 18 to 28 mm. of mercury. The diastolic pressure in the right ventricle was elevated in 8 cases. In many cases, systolic pressure in the femoral artery was of the same order as that in the right ventricle. Changes in the peripheral resistance occur as a compensatory response to the alterations in flow.

Oxygen consumption in the great majority of patients with decreased effective pulmonary flow is reduced. The basal metabolic rate calculated from the figures obtained ranged as low as −48. The basal metabolic rate of patients with reduced effective pulmonary blood flow increased considerably following the performance of the Blalock-Taussig operation, which raises the pulmonary flow.

During the standard exercise test, the ratios of oxygen consumed and of carbon dioxide produced per liters of ventilation decreased, while the arterial oxygen saturation dropped immediately following the exercise. Simultaneously, the arterial carbon dioxide content increased. Inadequate effective pulmonary blood flow, which causes the decline in the ratios of oxygen consumed and carbon dioxide produced per liters of ventilation, cannot be responsible for the changes in the arterial blood gases. Even in severely anoxemic patients, the blood reaching the left auricle is fully saturated with oxygen. It is, therefore, probable that shunts through the interventricular septal defect and the overriding aorta are responsible for the fall in oxygen saturation and the rise in carbon dioxide content of the arterial blood during exercise. SAMUEL KAHN, M.D.

ESOPHAGUS AND MEDIASTINUM

Schafer, P. W., and Kittle, C. F.: Esophageal Leiomyoma. *J. Am. M. Ass.*, 1947, 133: 1202.

Benign tumors of the esophagus are very rare. Moersch and Harrington report 44 in 7,459 necropsies (0.59%). At the University of Chicago, 11 were found in 6,001 necropsies (0.18%). About 200 cases have been reported; these include 12 varieties of tumor, of which myoma is the most frequent.

Myomas are most frequent in the distal third of the esophagus. They are multiple in about one-quarter of the cases, and produce symptoms in about one-tenth of the cases, i.e., only when the tumor is large. The symptoms are vague and indefinite pain; they are nonpathognomonic. Dysphagia is rare.

Four cases of surgical resection have been reported. The authors' case is the second successful surgical resection. The tumor was large (178 gm.) and had developed in the lower esophagus, giving symptoms of intermittent pain in the right lower part of the chest over a period of 18 months, and of acute pain for 2 days. The preoperative x-ray diagnosis was diaphragmatic hernia, which was also present.

FRANK B. QUEEN, M.D.

SURGERY OF THE ABDOMEN

ABDOMINAL WALL AND PERITONEUM

Christopher, F., and Penna, O. J.: The McArthur Operation for Inguinal Hernia. *Surgery*, 1947, 21: 482.

In evaluating a method of inguinal herniorrhaphy one must consider the type of hernia, the type of operation, the experience of the surgeon, the type of suture material, the age and occupation of the patient, the time of ambulation, and the care and accuracy of the follow up studies. Unfortunately, in many published series the follow up data are based on questionnaire replies rather than actual examination.

In the last 4 years the authors have done 202 direct and indirect herniorrhaphies by the McArthur technique.

The technique employed by the authors requires silk throughout. The sac is transfixed and ligated and the stump is fixed or allowed to retract under the interior oblique muscle. In small direct hernias the sac may not be opened. The cord is transplanted subcutaneously. The conjoined tendon and usually the transversalis fascia are sutured to Poupart's ligament by a continuous fascial suture prepared from the mesial border of the split aponeurosis of the external oblique muscle. One end of this suture is left attached to the symphysis pubis. When the cord is reached the suture is doubled back for a few bites. The end is securely anchored with 5 or 6 interrupted 00 silk sutures. With the cord elevated, the mesial border of the split aponeurosis of the external oblique muscle is sutured to the inguinal ligament with interrupted silk sutures. The outer layer of the aponeurosis is imbricated over it. The aponeurosis of the external oblique is imbricated above the cord, the lateral flap being uppermost. The opening for the cord is made large enough to admit a Kocher director in addition to the cord. Patients are encouraged to get out of bed on the first or second postoperative day and are sent home between the fourth and eighth days.

McArthur first described this operation in 1901. Since then Bisgard, Sachs, Joyce, and Ryan have endorsed the procedure.

One hundred and thirty hernia operations were done on 112 patients who reappeared for follow up examinations. Of these 71 were for indirect hernia, 31 for direct hernia, 7 for recurrent hernia, 2 for direct-indirect hernia, and in 1 case the hernia had no sac. In 18 cases the type of hernia was not specified. There were 106 male and 6 female patients with an average age of 46.6 years, the extremes being 19 and 75. The follow up period averaged 24.2 months, the extremes being 3 and 61 months. There were 2 deaths in the series, 1 from pulmonary embolus and 1 from pulmonary thrombosis. There were 4 known recurrences, a percentage of 3.1. Three patients had wound infections.

The authors list the recurrence rates of various surgeons who reported using this technique, and the overall recurrence rate was 3.1 per cent for 705 operations. Four surgeons using the Gallie operation had a recurrence rate of 24.8 per cent for 1,189 operations. A comparison is then made with the results of 10 surgeons who used a nonfascia operation; in this group the recurrence rate was 7.1 per cent for 6,379 operations.

The authors then give short abstracts of the case histories of the 4 patients who developed recurrences.

ROBERT R. BIGELOW, M.D.

GASTROINTESTINAL TRACT

Benedict, E. B.: The Limitations of Roentgenology and Gastroscopy in the Diagnosis of Diseases of the Stomach; An Analysis of 53 Proved Cases. *Gastroenterology*, 1947, 8: 251.

Gastroscopy supplements roentgenography in examinations of the stomach and in no way are the two competitive. In certain instances the roentgen ray examination appears to be superior to gastroscopy, and in other instances the reverse is true.

The chief causes of failure in gastroscopy are mechanical. Once the gastroscopist gets a satisfactory view of the lesion, his chances of reaching a correct diagnosis seem to be greater than those of the radiologist. Greater diagnostic accuracy is attainable when both methods are used co-operatively than when either method is used alone.

The author presents a series of 53 cases of proved gastric disease, including benign and malignant lesions. Case histories illustrate the limitation of x-rays and/or gastroscopy in each of various types of disease. In 19 proved carcinoma cases, the x-rays and gastroscopy both led to correct diagnoses in 10 instances. The diagnoses were both incorrect in only 1 case. In 8 cases, one method was more accurate than the other, 6 times in favor of gastroscopy and twice in favor of the x-rays. The author attributes this good showing for gastroscopy to recent mechanical advances. These improvements include the possibility of changing the angle of the mirror in 2 American gastroscopes, and proximal control of the flexible part in 1 of the English instruments.

HAROLD LAUFMAN, M.D.

Farneti, F.: Lymphogranulomatosis Primary in the Stomach (Linfogranulomatosi isolata e primitiva dello stomaco). *Arch. ital. mal. app. diger.*, 1947, 13: 3.

A review of the literature shows that 16 cases of lymphogranulomatosis involving the stomach alone have been reported. To this number Farneti adds 1 in which a 38 year old man presenting the clinical picture of a gastric ulcer died suddenly of hemorrhage. Autopsy revealed changes in the stomach

wall suggestive of linitis plastica, with involvement of the regional glands. The mucosa of the stomach was found to be greatly thickened, reaching at some places a thickness of 1.5 cm.

Microscopic examination of the stomach and lymph glands confirmed the impression of a malignant granuloma with the primary lesion in the stomach. The histological character of the affected tissue conformed to the phlogistic infiltrative category.

EDITH B. FARNSWORTH, M.D.

Orr, T. G.: A Modified Technique for Total Gastrectomy. *Arch. Surg.*, 1947, 54: 279.

The author describes a new modification of esophagojejunal anastomosis in total gastrectomy. It is essentially an adaptation of the Roux-en-Y technique. The end of the distal portion of the jejunum is closed below the ligament of Treitz. It is then brought up either through the transverse mesocolon or in front of the colon and connected to the end of the esophagus by an end-to-side anastomosis. The proximal end of the jejunum is then anastomosed into the side of the jejunum below the transverse mesocolon.

The advantages of the technique described are: (1) the direct entrance of the food into the jejunum distal to the anastomosis without filling of the proximal part of the jejunum as in the loop operation; (2) elimination of distention or delay in emptying of the proximal portion of a loop; and (3) elimination of any regurgitation of the duodenal contents into the esophagus. The postoperative progress in 4 of the cases recorded was uneventful. In the fifth, the

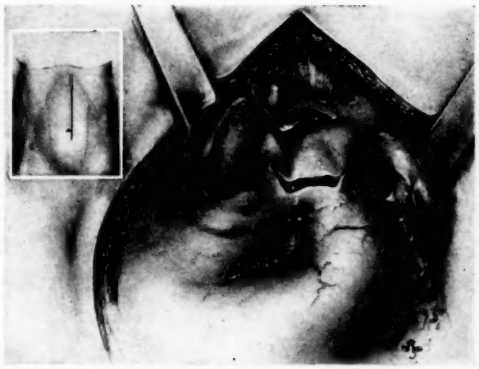


Fig. 1. (Orr) Technique of total gastrectomy. The insert shows the type of paramedian incision used. The ligament of the left lobe of the liver has been severed and sutured beneath the right side of the abdominal wall to retract the left lobe. An incision has been made for the formation of peritoneal flaps and exposure of the esophagus.

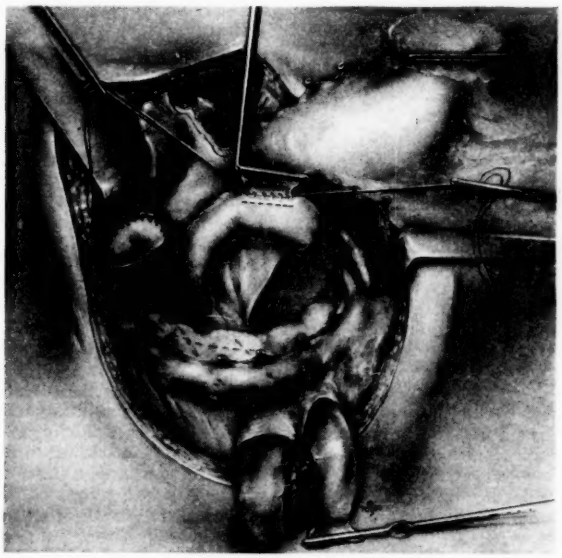


Fig. 2. Technique of total gastrectomy (continued). The jejunum is divided 15 cm. below the ligament of Treitz. The end of the distal portion of the jejunum is closed, and the first row of sutures and lines of incision are shown in the esophagus and jejunum as the first step in end-to-side esophagojejunostomy.

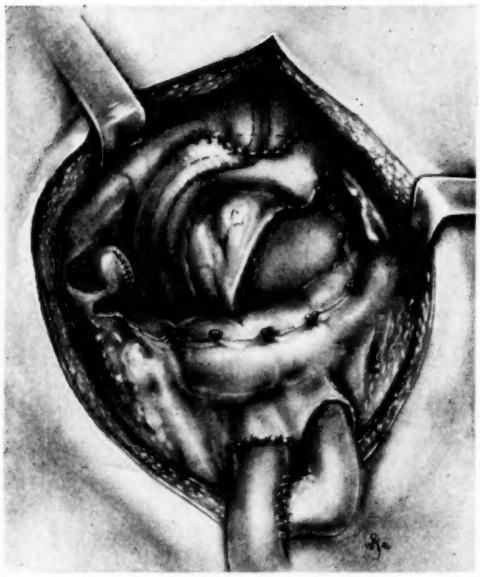


Fig. 3. (Orr) Technique of total gastrectomy (concluded). The end-to-side esophagojejunostomy is completed, showing peritoneal flaps sutured to the jejunum over the anastomotic line of suture. Lateral sutures have been placed to fix and suspend the jejunum. Postcolic end-to-side jejunojejunostomy is completed. The mesentery of the colon is sutured to the jejunum and the mesentery of the jejunum to close the defect in the mesocolon.

patient died following a hemiplegia on the fortieth postoperative day.

The author suggests that with constantly improving methods of supportive treatment for patients submitting to surgical procedures, and improvement and standardization of technique, it seems reasonable to predict that the mortality rate for total gastrectomy in the future will not exceed from 10 to 15 per cent. HAROLD LAUFMAN, M.D.

Moore, F. D., Chapman, W. P., Schultz, M. D., and Jones, C. M.: Resection of the Vagus Nerves. *J. Am. Ass.*, 1947, 133: 741.

Of 33 patients who were treated by vagotomy or vagus resection and observed for from 3 months to 2 years, 29 have shown good results clinically. Healing of the ulcer is the most uniform feature of this series. Recurrences have not been encountered, but transient undesirable side effects occur, and are found in about 10 per cent of the patients.

The decrease in fasting acidity and motility, which is so readily demonstrable after the operation, gradually returns toward normal until, at the end of a year, little abnormality of these factors can be found. The secretory response to insulin induced hypoglycemia remains abolished in most cases, and the clinical well-being of the patients also appears to outlast the duration of the early secretory and motility changes. This strongly suggests that, although the immediate relief of pain and the healing of the ulcer may be due to changes in the fasting motility or the secretion produced by the operation, any prolonged relief which the surgical procedure confers on the patient is due to some more subtle effect. This more subtle effect is probably traceable to severance of those nerve pathways which communicate the patient's adaptive reactions from brain to stomach. In patients suffering from peptic ulcer, impulses transmitted over these pathways in response to environmental situations often result in exacerbation of the disease. After resection of the vagus nerves, such impulses cannot reach the stomach and exacerbations of the ulcer do not occur.

SAMUEL KAHN, M.D.

Evans, E. I., and Bigger, I. A.: Intestinal Strangulation. *J. Am. M. Ass.*, 1947, 133: 513.

Strangulation of the small bowel was responsible for more deaths in the hospitals of the Medical College of Virginia in the years 1941 to 1946 than appendicitis with rupture and peritonitis. Differentiation of simple obstruction and strangulation obstruction is paramount. Pain is the commonest symptom in obstruction of the small bowel. There is a dramatic onset of pain in strangulating obstruction. The incidence and frequency of repeated vomiting is greater in patients with strangulating obstruction. The patient with a strangulated obstruction usually appears extremely ill continuously.

The authors explain in detail the sign of "position of relief." It is thought that this "position of relief" reduces traction on the mesentery. Furthermore, this one position of relief is highly suggestive of strangulation of the bowel. Only after inspection, palpation, percussion, auscultation, and pertinent laboratory data can one make the proper diagnosis. There is no significant difference in the general appearance of the abdomen in the two types of obstruction. Abdominal palpation showed abdominal tenderness to be present in all cases of strangulation. Tenderness and muscular spasm usually mean strangulation. A palpable mass further clinches the diagnosis. In the laboratory data, a rising leucocyte count is suggestive of intestinal strangulation. A pulse rate above 100 in the earlier hours generally indicates intestinal strangulation.

In the management of intestinal strangulation a transfusion of whole blood is mandatory. Evidence indicates that some 1,500 to 2,000 c.c. of whole blood will be required to restore to normal the blood volume in this type of patient. A Levine tube should be inserted into the stomach and the stomach emptied by suction drainage. Dehydration is combated by intravenous isotonic solution of sodium chloride. Surgical operation should be carried out as soon as the patient is prepared, care being taken that not too long a time elapses between onset of the condi-

tion and operation. Shock and peritonitis in acute strangulation of the small bowel are usually due to avoidable delay in surgical intervention. Early diagnosis and treatment is the safest course.

Tables are presented, which give all the data on the clinical cases and the physical and laboratory observations in intestinal strangulation. Table 3 lists the differential criteria in simple obstruction and strangulation. RICHARD J. BENNETT, JR., M.D.

Magney, F. H.: Acute Intussusception in Infancy and Childhood. *Minnesota M.*, 1947, 30: 257.

The author presents an analysis of 58 cases of acute intussusception in infants and children admitted to 2 hospitals during the 25 year period from 1921 to 1945 inclusive.

The age incidence was as follows: 74 per cent of the patients were under 1 year of age, the highest incidence being at 6 months; 95 per cent were under 3 years. The youngest was 7 days old, the oldest 12 years. There were 35 males and 23 females.

Meckel's diverticulum in 2 patients was the only pathologic condition found at operation which could be considered as an etiological factor.

Vomiting was the most frequent symptom, occurring in 88 per cent of the patients. Cramplike, intermittent abdominal pain was present in 70.7 per cent, and bloody stools were noted in 63.8 per cent. Seventy-three per cent of the patients presented all of these symptoms, and all had at least one of them.

Fever was present in 38 per cent of the patients. Abdominal masses were noted in 60 per cent, and rectal masses in 20 per cent.

Nonoperative methods of treatment were not used. Preoperative and postoperative measures to combat dehydration, toxicity, or shock are essential and should be under the direction of a pediatrician.

Ether is the anesthesia of choice and was used, by the open drip method, in 53 of the 58 operations. A right rectus incision was routinely made.

The types of intussusception were as follows: ileocolic in 49 patients; ileoileal in 5; colocolic in 4.

The operative procedure was manual reduction in 49 patients. Additional operative procedures were appendectomy in 10 patients, some method of fixation of the intestine in 5 patients, and appendectomy and fixation in 1 patient.

Intestinal resections were performed in 7 patients. Five of these were combined with anastomoses, 1 with a double enterostomy, and 1 with a single enterostomy. In 1 patient an anastomosis was made around the irreducible mass.

The intussusception recurred in 2 patients, and a second operation was necessary.

The duration of symptoms is the greatest single factor responsible for the high mortality. The mortality rate rose from 18 per cent for the first day to 23 per cent for the second day, and to 50 per cent for the third day.

Deaths in relation to the types of intussusception were as follows: 2 deaths in 5 cases of ileoileal (40 per cent mortality), 12 deaths in 49 cases of ileocolic (24.7 per cent mortality), and 1 death in 4 cases of colocolic intussusception (25 per cent mortality).

Of 49 patients treated by manual reduction of the intussusception, 8 died, a mortality rate of 16.3 per cent. Intestinal resections in 7 patients resulted in 4 deaths, a mortality rate of 57.1 per cent. The total surgical mortality rate was 25.9 per cent. There has been a progressive improvement in results in recent years. The first 10 years showed a mortality rate of 46.7 per cent as compared with 18.1 per cent during the last 15 years. There were 2 deaths among 17 patients operated upon in the last 5 years, a mortality rate of 11.8 per cent. ERNEST E. ARNHEIM, M.D.

Silverman, D. N., and Leslie, A.: Intestinal Tumors. *J. Am. M. Ass.*, 1947, 133: 994.

Six cases of inflammatory intestinal tumors of specific nature occurring as a complication of amebic or bacillary involvement of the intestine, are reported. Amebic granulomas occurring, as they do, only in the colon, cannot be distinguished radiologically from cancer. In most of the cases hitherto described and in 2 of those reported in the present article, the patients were subjected to unnecessary laparotomy because of the preoperative diagnosis of colonic neoplasm. Since there is such variation in therapy and prognosis, it is important to distinguish amebic granulomas from malignant tumors.

Special attention is called to 1 case of ileocecal inflammatory tumor occurring in bacillary dysentery and 1 such tumor in combined amebic and bacillary disease. Although the occurrence of inflammatory tumors in the course of chronic bacterial dysentery is rare, such cases may be expected to occur with greater frequency in the future, because of the present widespread dissemination of infection due to Bacterium dysenteriae throughout the United States.

The outstanding and almost universal characteristic of amebic granulomas is their response to specific therapy. There is a rapid resolution of large tumors after the administration of emetine hydrochloride. An amebic granuloma in which extensive fibrosis has taken place may require surgical intervention, but this should not be considered until thorough amebicidal therapy has proved inadequate. In 3 of the cases reported, large tumors disappeared after medical therapy alone. A large granuloma associated with infection with Bacterium flexneri did not respond to autogenous vaccine therapy and surgical resection was successfully performed.

Rectal scrapings, or even a biopsy, if a tumor is within reach of the sigmoidoscope, can be diagnostic. If amebic granulomas are considered in the differential diagnosis of tumors of the colon, careful examination of the saline-purged stool will, in most instances of amebic tumors, reveal the protozoon. In isolated instances, as in one of the cases of this series, the amebas are present only in the depths of the tumor mass and elude the parasitologist. Although it is contrary to scientific procedure to give specific treatment without a specific diagnosis, a case such

as this, which terminated fatally following surgical resection, gives one pause; and in the younger age group at least, when the history is at all suggestive of dysentery, a therapeutic test might well be justified. The problem of amebic granulomas is no longer regional, since cases are reported from northern areas. JOHN L. LINDQUIST, M.D.

Boriani, G.: Roentgenologic Picture of Bulbar Duodenitis of the Ulcer Type, and Its Medicolegal Importance (Quadro radiologico della duodenite bulbare a tipo di ulcera e sua importanza ai fini medico-legali). *Radiol. med.*, Milano, 1947, 33: 15.

The clinical picture of bulbar duodenitis is revealed by a heavy feeling, pain, and a burning sensation; melena may also be present. Usually, the roentgenological diagnosis is easy; small opacities or small cul-de-sac defects are seen between the mucosal plicae, or, otherwise, small ulcerations. Edematous mucosa may obliterate the normal plicae. There is a type of duodenitis, however, in which edematous nodules are arranged so as to make it difficult to differentiate between bulbar duodenitis of the ulcer type and a true duodenal ulcer.

It is noted, according to Akerlund, that the typical duodenal ulcer presents a three leafed clover appearance with 2 leaves on the base toward the pylorus and the third leaf above; in other words, a sessile clover without a stem. In bulbar duodenitis the picture is at times similar, which may cause confusion, but there is a substantial difference in that either the clover has an inverted appearance, with the 2 leaves above and 1 leaf toward the pylorus, or if the clover is analogous in position to that found in duodenal ulcer, there is a small stem present, which is not found in duodenal ulcer.

The authors cite the importance of this differentiation because duodenitis might easily be caused by the patient's eating an irritative substance, and, thus, a picture of duodenal ulcer might be produced intentionally for personal reasons. Many such cases were observed during the war, in which there was no evidence of duodenal bulb deformity when the person was recalled back without warning in several days. LUCIAN J. FRONDUTI, M.D.

Rogers, H. M., Keating, F. R., Jr., Morlock, C. G., and Barker, N. W.: Primary Hypertrophy and Hyperplasia of the Parathyroid Glands Associated with Duodenal Ulcer; Report of an Additional Case, with Special Reference to Metabolic, Gastrointestinal, and Vascular Manifestations. *Arch. Int. M.*, 1947, 79: 307.

A case is reported in which pronounced clear cell hyperplasia of the parathyroid glands and primary hyperparathyroidism were associated with healed duodenal ulcer. The parathyroid glands weighed 47.56 gm. Peripheral gangrene developed as a terminal event. Death resulted from renal insufficiency secondary to nephrocalcinosis. Pancreatic lithiasis and mild osteitis fibrosa cystica were also disclosed at autopsy. An unusual type of necrosis of the arterial walls, with intimal calcification, appeared responsible for the peripheral gangrene. Gastrointestinal symptoms, which were presumed during life to be due entirely to ulcer, appeared in retrospect to have been manifestations of severe hyperparathyroidism.

Shallow, T. A., Wagner, F. B., Jr., and Manges, W. B.: Enterogenous Cysts of the Duodenum. *Surgery*, 1947, 21: 532.

Enterogenous cysts of the duodenum, in spite of their rarity, should be recognized by the surgeon when they are encountered unexpectedly at laparotomy, and a knowledge of the proper methods of treatment is essential.

The authors report the case of a 12 year old boy who had suffered recurrent attacks of high intestinal obstruction since the age of 1 year, and who passed tarry stools prior to admission. His abdominal examination was negative. Laboratory studies revealed a moderately severe anemia and stools positive for blood. Roentgenograms of the upper gastrointestinal tract showed an elongated filling defect in the second portion of the duodenum, with a slight irregularity of the defect, suggestive of ulceration. These findings were interpreted as being suggestive of a leiomyoma with ulceration in the second portion of the duodenum, or of a gastric polyp prolapsed into the duodenum.

After correction of the anemia the patient was explored. Palpation revealed a semifluctuant mass about 3 cm. long in the second portion of the duodenum along the mesenteric border adjacent to the pancreas. Exploration through a gastrotomy incision showed no polyps nor stomach abnormality but, instead, a smooth, circumscribed, semifluctuant mass arising from the wall of the second portion of the duodenum and projecting into the lumen. The duodenum was then opened opposite the mass, and the ampulla of Vater and the pancreatic duct orifice were identified at the upper border of the mass. From within the duodenum a transverse incision was made through the mucosa overlying the mass. With some difficulty the mass was excised intact from its submucosal position without rupturing through the posterior duodenal wall. The mucosal and longitudinal incisions were closed, thus re-establishing duodenal continuity. The gastrotomy wound was then closed before closing the abdomen in layers, without drainage. The operation lasted 1½ hours and the patient was given 500 c.c. of blood.

The pathological specimen was a thin-walled cyst, 2.3 by 2.1 by 1.5 cm., containing thick cloudy fluid. The lining was a duodenal type of mucosa and outer wall muscularis.

The postoperative course was uneventful, and follow-up roentgenograms at 4 months showed a normal mucosal pattern of duodenum at the site of the cyst. The patient was entirely well 1 year after operation.

The authors were able to collect only 13 other cases of enterogenous duodenal cysts from the world literature. These are briefly analyzed. In 10 cases the cysts occurred between birth and 4 months of age.

The oldest patient was 15 years of age. There were 3 males and 9 females.

Lewis and Thyng believe these cysts arise from detachment of knoblike diverticula which occur along the entire intestinal tract of embryos of man, the pig, and the rabbit. Hughes and Jones believe that sequestration of embryonal intestinal epithelium early in fetal life may give rise to enterogenous cysts. Maddox favors the theory of origin from a vacuole arising during the so-called solid stage of the intestine, which fails to gain communication with the developing lumen.

Although there are wide pathological variations, these cysts are all adherent to some portion of the duodenum, all contain fluid, and their walls are composed of all layers of the intestine.

In the authors' series, 5 cysts were located in the first portion and 5 in the second portion of the duodenum. They were round or pear-shaped and from 2 cm. to 12 cm. in diameter. The contained fluid was clear and pale, or cloudy and dark. In no case was a communication with the lumen demonstrated.

Multiple congenital abnormalities including multiple intestinal and biliary cysts, accessory spleens, transposition of the viscera, and a mediastinal cyst were observed in several cases.

Histologic examination of these cysts reveals a mucosal lining, usually duodenal in type. The mucosal lining may at times correspond to other levels of the gastrointestinal tract. The smooth muscle coat is a constant feature of the lesion, and it is adherent to, or continuous with, the muscularis of the duodenum, allowing no cleavage plane.

Enterogenous cysts are seen much more frequently in the ileocecal region.

Clinically these duodenal cysts produce obstructive symptoms by encroaching on the lumen. One may elicit a history of vomiting, intermittent colicky pain, a palpable mass, visible peristalsis, melena, anemia, and possibly jaundice, depending on the size and position of the tumor and the degree of pressure and necrosis of the duodenal mucosa. X-ray examinations of the upper gastrointestinal tract, colon, and kidney may aid in the diagnosis.

If a fluctuant mass is palpable, omental, chylous, dermoid, pancreatic and choledochal cysts must be considered in the differential diagnosis. If the mass is more resistant, it may resemble hypertrophic pyloric stenosis, intussusception, renal tumor, or leiomyoma.

In the absence of a mass, pylorospasm and congenital duodenal diverticulum, atresia, or adhesive bands must be considered.

Surgery is the treatment of choice and the method employed must be determined by the individual case. Excision of the cyst is usually mechanically impractical because of the continuity of the cyst and duodenal muscle layers. Injury to vessels during excision may lead to bowel wall necrosis, since the cyst and duodenum have a common blood supply. Excision from within the lumen was successfully carried out by the authors, and from without by Rogers. Resection of the duodenum containing the cyst and re-establishment of continuity is too formidable a procedure in infants and in debilitated patients, and not feasible when it would involve the pancreatic and biliary ducts. In poor risk patients, window anastomosis to the adjacent duodenal lumen or to a loop of jejunum, the segments of which are joined in an enteroenterostomy to divert the intestinal stream, may successfully be carried out. Marsupialization can be undertaken if the cyst is large. Aspiration or catheter drainage is to be condemned. In 1 case gastroenterostomy alone to relieve obstruction was successful.

The high mortality (50%) is due to the early age of the average patient, and the frequently poor preoperative condition of the infants. The immediate and ultimate prognosis is good in the older patients (all 4 of the older patients recovered following surgical treatment). It is hoped that by more competent pre- and postoperative care, the higher mortality among infants can be reduced.

ROBERT R. BIGELOW, M.D.

Andrucci, M.: Osteopetrosis and Cancer of the Duodenum (Osteopetrosi e cancro duodenale). *Arch. ital. chir.*, 1946, 68: 309.

The author describes a case in which cancer of the duodenum coexisted with an eburnating osteosis diffused throughout the whole skeleton. Two types of osteopetrosis can be distinguished, one in the child, which is hereditary or congenital, and the other in the adult, which is acquired. The lesions found in adults may be regarded as primary, and not as late manifestations of pre-existent lesions, for the anatomic picture observed in adult patients is substantially different from that observed in children.

The eburnation process may depend on such vascular alterations as obliterating endarteritis secondary to chronic bone inflammation in which the reduced vascular activity can provoke a gradual sclerosis of the medullar tissue and a higher deposition of calcareous salts.

All the regions affected by osteopetrosis in the author's case had reduced circulatory activity because of vascular lesions of luetic nature and mechanical obstacles provoked by the small metastatic embolisms of the tumor. These lesions might be found in all organs including the skeleton.

ARTHUR F. CIPOLLA, M.D.

Griffin, W. D., Silverstein, J., Hardt, H. G., Jr., and Seed, L.: Prophylactic Chemotherapy in Appendicitis. *J. Am. M. Ass.*, 1947, 133: 907.

The benefits of prophylactic administration of penicillin and sulfadiazine in war wounds and in many varieties of surgical procedures have been demonstrated beyond doubt. Many surgeons, however, hesitate to subject all their surgical patients to a rather stereotyped regimen of prophylactic therapy. The authors report the results of the routine systemic administration of penicillin and sulfadiazine in a series of 108 consecutive patients operated on for acute appendicitis in the Cook County Hospital, Chicago. The circumstances per-

mit fairly accurate comparison with series of patients treated in previous years, since the only difference in treatment has been the introduction of the routine use of penicillin and sulfadiazine in the present series.

Twenty thousand units of penicillin were given intramuscularly with the preoperative medication. This was followed postoperatively by 20,000 units of penicillin every 3 hours for 4 days. The patients also received 1 gm. of sulfadiazine four times a day for 4 days postoperatively. If the patient was unable to tolerate oral medication, 5 gm. of sodium sulfadiazine in 1,000 c.c. of saline or dextrose solution was given daily by the intravenous route. In children the dosage of penicillin was the same as in adults, but the dosage of sulfadiazine was reduced in proportion to the age of the patient.

The 108 cases were classified as follows: (1) acute suppurative appendicitis, 62 cases; (2) acute gangrenous appendicitis, 17 cases; (3) perforated appendicitis, 29 cases. There were 77 adults and 31 children. There was only 1 death in the series. This patient was a middle aged obese woman with hypertension, severe diabetes, and symptoms of 5 days' duration, who died in a diabetic acidosis that did not respond to insulin treatment.

A table shows the death rate following appendectomy for the years 1928 to 1932 as 7.6 per cent; for 1937 and 1938 as 3.9 per cent; and for 1944 and 1945 as 4.3 per cent, as compared with a mortality of approximately 1 per cent which occurred in the present series.

In addition to the reduction in mortality there was a comcomitant observable reduction in morbidity. The patients were more comfortable, had less abdominal pain and less abdominal distention, and were able to tolerate a full diet at an earlier date. In the past the majority of patients with perforated appendicitis had considerable postoperative ileus with abdominal distention. Only 1 patient in this series had a paralytic ileus severe enough to warrant the use of Wangensteen suction. Three cases of intra-abdominal abscess and 1 case of pelvic abscess were observed in this series. These abscesses subsided spontaneously on the continuation of the routine administration of penicillin and sulfadiazine. The use of penicillin and sulfadiazine seemed to prevent the development of severe infection in the wounds. There were 9 instances of wound infections. There was a definite reduction in the duration of hospitalization. Since no organized effort was made to send the patients home at an early date, this indicates in general a shorter and less complicated convalescence. JOHN L. LINDQUIST, M.D.

Bartlett, R. W.: Management of Colostomies in the Fifteenth Hospital Center (England). *Arch. Surg.*, 1947, 54: 269.

War injuries to the large bowel are complicated in a high percentage of cases by other major injuries. Before closure is attempted, care must be taken that colostomy spurs are adequately obliterated, and that edema of the bowel and active infection of the wound are no longer present. Compound fractures of the pelvic bones with osteomyelitis and purulent drainage in the neighborhood of the colostomy are an absolute contraindication to repair as failure will result because of infection in the wound. If a suprapubic cystotomy and colostomy coexist, the former should be permitted to heal before closure of the colostomy is carried out in order to avoid continual soaking of the wound with urine.

During the period of evaluation and preparation, the patients were maintained on high protein, high caloric diets, with multivitamins and full correction of any existing anemia or hypoproteinemia. Barium enemas and proctoscopic examinations were performed, especially in cases in which there had been a rectal wound, in order to be sure that a perforation no longer existed at the time of repair. Immediately before operation the patient was placed on a nonresidue diet for 3 or 4 days and mild catharsis was instituted. Frequent irrigations of both colostomy loops were carried out.

Many closures can be kept extraperitoneal. In the case of closure of sigmoid colostomies, the author has employed a medium calibered latex tube as a safety valve above the suture line. Subcutaneous drains were placed in most closure wounds for 48 hours postoperatively. Penicillin and sulfadiazine in standard doses were used in perhaps half of the cases in this series. Since the advent of succinylsulfathiazole, this drug has been used routinely.

Of 298 colostomies, 238 were closed by simple transverse closure of the loop or closure following spur crushing, while 60 were closed by end-to-end anastomosis. There was 1 postoperative death. The author explains that this excellent result was probably due to the fact that the patients were vigorous young men undergoing elective operation, and that unlimited supplies of such essentials as blood, plasma, and chemotherapeutic agents were available throughout the preoperative and postoperative periods. HAROLD LAUFMAN, M.D.

Spatolisano, B.: A Case of Lipoma of the Descending Colon (Sopra un caso di lipoma del colon discendente). *Rass. internaz. clin. ter.*, 1947, 27: 45.

A lipoma of the descending colon was found in a 26 year old male patient who had the following symptoms: a sensation of insufficient bowel evacuation, constipation followed by diarrhea, and, at irregular intervals, severe abdominal pain in the left lower quadrant, distention of the abdomen, nausea, and vomiting. X-ray examination revealed an obstruction.

Through a left pararectus incision, a tumor was discovered in the midportion of the descending colon. The bowel was opened, and a submucous mass, the size of an apple, with a 2 cm. ulceration was resected. The bowel was exteriorized. Eleven weeks later an end to end anastomosis was performed, and the patient made an uneventful recovery.

ARTHUR F. CIPOLLA, M.D.

Calmenson, M., and Black, B. M.: Surgical Management of Carcinoma of the Right Portion of the Colon with Secondary Involvement of the Duodenum, Including Duodenocolic Fistula. Observations on 8 Cases. *Surgery*, 1947, 21: 476.

In 8 cases seen between 1907 and 1945, carcinoma of the right portion of the colon with secondary malignant involvement of the duodenum was treated surgically at the Mayo Clinic. The diagnosis of a duodenocolic fistula is usually made roentgenologically. The symptoms do not differ from those of a gastrocolic fistula. Persistent diarrhea and a rapid loss of weight, often accompanied by pain and anemia, are usually present, and the occurrence of fecal vomiting is common. The second portion of the duodenum was involved in 7 of the 8 cases; the first portion, in 1 case. In 2 of the cases involvement of the duodenum took the form of a duodenocolic fistula. Duodenocolic fistula secondary to malignant disease of the colon is a rare entity and occurs only when the disease is advanced.

The lesions were removed in one or two stages. In 7 of the 8 cases, right hemicolectomy, with local excision of a portion of the duodenal wall and duodenoplasty, was carried out. In the remaining case segmental resection of the colon, with partial gastrectomy and partial duodenectomy, was done.

The risk of operation in these cases is high. There were 3 deaths in the hospital among the 8 cases. The prognosis in such cases is unfavorable. In the present series, the longest survival period following operation was 1 year.

Rosser, C., and Kerr, J. G.: Pilonidal Disease. *J. Am. M. Ass.*, 1947, 133: 1003.

Prior to the recent war the preponderance of surgical opinion was in favor of the so-called open operation for the treatment of pilonidal disease. In contrast practically all the reports by medical officers of their experience while in service favor and advocate some attempt at closure. The latter recommendations appear to be about equally divided between methods of partial closure and complete primary suturing of the wound. The author points out that military conditions require a method of treatment that rehabilitates and returns a soldier to duty as quickly as possible, since there is little space available for prolonged hospitalization and no provision for extended convalescence. In civilian practice most patients are allowed to resume their usual activities within 2 weeks after block excision and open packing, whereas a soldier with an unhealed wound must be a hospital patient.

To supplement the published literature on this subject and to obtain the opinion of a group of proctologists whose work before the war included surgical experience in the management of pilonidal disease, capable of serving as a basis of comparison with their own military observation, a questionnaire was addressed to 35 rectal surgeons who served in World War II. A brief expression was requested on present opinion in regard to the open or closed type of procedure in civilian practice together with any preference for a special technique in either case. Nonmilitary conditions were specified in the questionnaire, because of the different necessities of civilian and military practice with respect to the period of hospitalization and the return to duty.

Twenty-seven answers were received, and 21 of those who replied (77.7%) now regard the open type of operation as the best standard procedure under the conditions stipulated. Five (18.5%) believe that various closed procedures which were developed in military service will be routinely satisfactory in private practice. Some proctologists set up exacting criteria for the use of the closed procedure. Others who favor open procedures for the majority of cases have become convinced that under certain specified conditions the wound may well be closed at the time of operative intervention. A surprisingly large number of answers expressed satisfaction with the open procedure by which the lesion is marsupialized.

Fair consideration of the studies made by military surgeons indicates that there will be a place in civilian practice for marsupialization and for the reconstructive primary closure of pilonidal wounds when properly indicated and properly performed.

JOHN L. LINDQUIST, M.D.

Rietti, F.: Transitory Icteroascitic Syndrome following Sclerosing Treatment for Hemorrhoids (Sindrome ittero-ascitica transitoria insorta dopo cura sclerosante delle emorroidi). *Arch. ital. mal. app. diger.*, 1947, 13: 65.

A forty two year old male underwent treatment for external hemorrhoids, consisting of the injection of a 5 per cent solution of quinine hydrochloride and urea. Two weeks after the conclusion of treatment, the patient developed jaundice, with claycolored stools and bile pigment in the urine. Although anorexia and asthenia were marked, there was no elevation of temperature. The appearance of ascites led to paracentesis which showed a straw colored fluid without evidence of protein. Generalized pruritus was present, and sinus bradycardia was noted by the consultant. The clinical picture subsequently improved, and the patient appeared to have recovered.

The author supplies a cursory review of opinions on the icteroascitic syndrome, and proposes three hypotheses: (1) there is no relation between the injection treatments and the liver disturbance; (2) there is a hypersensitive reaction to quinine which involves the liver; and (3) there is an establishment of a thrombophlebitic process proceeding from the inferior vena cava to the portal vein. The absence of laboratory studies makes a definitive diagnosis difficult, but the third theory is favored by the author.

Although recovery seemed to be complete, the patient was to be watched for evidence of hepatic cirrhosis.

EDITH B. FARNSWORTH, M.D.

LIVER, GALL BLADDER, PANCREAS, AND SPLEEN

Pettinari, V.: Contributions to Hepatic Surgery (Contributi di chirurgia epatica). *Minerva med.*, Tor., 1947, 38: 134.

Seven cases of surgery of the liver are reported. The series comprises 2 instances of solitary adenoma, 2 of echinococcus cysts, and 1 instance each of primary carcinoma involving excision of the entire left lobe, solitary cyst, and melanotic tumor with secondary hemorrhage.

Resections of varying portions of the liver were done in all 7 cases with complete return to health in 5. Therefore, it is stressed that hepatic surgery is not as formidable as is generally believed, and that with good preparation and accurate surgical technique, such interventions may be undertaken without undue risk.

It is to be hoped that diagnostic means may be found by which certain lesions of the liver may be identified and given timely surgical treatment.

EDITH B. FARNSWORTH, M.D.

Brewer, A. A.: Cholecystography; A Comparative Study of Oral and Intravenous Contrast Substances. *Radiology*, 1947, 48: 269.

For the past 20 years cholecystography with tetraiodophenolphthalein was accepted as the best procedure for the examination of the gall bladder, and the intravenous method was considered superior to the oral method.

The more recent introduction of priodax, however, soon created the impression that this new dye is an excellent oral contrast medium having definite advantages over the tetraiodophenolphthalein. The author in the present study publishes the results of oral cholecystography with priodax in a series of 150 patients, 46 of whom were also subjected to intravenous cholecystography with sodium tetraiodophenolphthalein for the purpose of comparison.

A proper technique is essential. By the oral method, 6 priodax tablets of 0.6 mgm. are swallowed whole during the course of a fat-free evening meal and the first roentgenogram is made the next morning (15 hours later) on an empty stomach. In the intravenous method, 3.5 mgm. of sodium tetraiodophenolphthalein, after being dissolved, properly filtered, and sterilized, is diluted in 500 c.c. of normal saline solution and injected slowly (in 45 minutes) to obviate too much reaction. Roentgenograms are made 4, 8, and 24 hours later.

In 104 patients the gall bladder appeared normal with the oral method of priodax. In 46 patients it appeared to be abnormal and therefore this group was re-examined with the intravenous sodium tetraiodophenolphthalein. In 39 instances the 2 examinations were in perfect accord, while in 7 there was definite disagreement.

In looking for the cause of disagreement the author found that all 7 patients had eaten no fat food, or no food at all, prior to the examination. The priodax given orally led to a faint shadow of the gall bladder, indicating poor concentration of the dye, but the intravenous method with sodium tetraiodophenolphthalein elicited fairly good to normal density of the gall bladder shadow. From this the author concludes that the gall bladder probably was full of thick concentrated bile which prevented the entrance of the fresh dye-ladened bile.

In 1935 Jenkinson recommended that all patients with nonvisualization of the gall bladder be placed on a diet rich in fats and re-examined after a month. It seems that such a procedure has a very definite advantage since it cleanses the gall bladder of the stagnating thick bile. Therefore, one may assume that in the presence of a gall bladder with faint filling the accuracy of the diagnosis may be improved by repeating the examination with intravenous cholecystography preceded by a high fat diet.

T. LEUCUTIA, M.D.

Calzolari, T., and Dolfini, G. E.: Calcareous Cholelithiasis Simulating a Porcelain Gall Bladder (Colelitiasi calcarea simulante una cistifellea porcellana). *Policlinico*, sez. chir., 1947, 54: 36.

A single case of biliary calculi is reported, in which the large calculus was of pure calcium carbonate, while the lesser calculus was composed of a nucleus of cholesterol surrounded by calcium carbonate. Because of the unused volume of the gall bladder, the form suggested by the first type of stone, and the peculiar configuration of the second stone, a false roentgenographic interpretation of total calcification of the wall of the gall bladder was made.

The largest stone was 50 mm. in length, 20 mm. in diameter, and weighed 11.5 gm., while the smaller stone was 12 mm. in length, 6 mm. in its greatest diameter, and weighed 70 centigrams.

Calcium carbonate stones may be divided into two types: (1) small stones which are of hard consistency, and (2) larger stones which are less hard or even of soft consistency. The calcium may be derived from bile or exudate rich in calcium. While the pathogenesis is dependent on obstruction of the cystic duct, stasis of bile, and infection of the gall bladder, the main factors responsible for the production of any one specific type of stone, are (1) the special degree of virulence of the bacteria, and (2) the special infection of the gall bladder.

ARTHUR F. CIPOLLA, M.D.

Hultborn, K. A.: On Spontaneous Complete Discharge of Stones from the Gall Bladder and Common Duct. *Acta chir. scand.*, 1947, 95: 260.

The author describes 3 unusual cases in which stones in the gall bladder and bile ducts were believed to have passed spontaneously.

The first case was that of a young woman who had 5 typical attacks of gallstone colic. Cholecystography established the presence of a large number of peppercorn sized nonroentgenopaque stones present in the gall bladder. At operation 2 months after x-ray examination no concretions could be detected.

Two additional cases were presented in which initial cholecystography revealed several small stones that subsequently disappeared upon repeated x-ray examinations. In all 3 cases the stones were of a very small size.

In view of the possibility that gallstones, if they are sufficiently small, may pass into the duodenum spontaneously, the writer suggests that it may be advisable to use choleretics, cholecystokinetics, and spasmolytics to improve the prospect for the spontaneous passage of concretions. Bile salts stimulate bile secretion, and olive oil and egg yolk produce emptying of the gall bladder. Antispasmodics relax the sphincter of Oddi and small doses of magnesium sulfate favor the evacuation of the gall bladder.

If spontaneous passage of small gallstones may evidently occur, then repeated cholecystography is advisable if some time has elapsed between the x-ray examination and the intended operation.

The author considers it quite unlikely that the unusual disappearance of gallstones is the result of their spontaneous dissolution. He prefers to believe that small stones may pass by natural processes from the gall bladder through the biliary ducts into the duodenum. EDWARD F. LEWISON, M.D.

Gaertner, E.: Cystic Dilatation of the Common Duct. Endocholedochorrhaphy. Cure (Dilatação cística do colédoco. Endocoledocorrafia. Cura). *Rev. brasil. cir.*, 1947, 16: 65.

A cystic dilatation of the common duct was observed by the author in a 14 year old boy, with complaints of a year's duration. A tumefaction in the right upper quadrant of the abdomen was changing its size from time to time. Frequent attacks of nausea and vomiting were recorded in the history. The percussion sound over the tumefaction was sonorous.

A tentative diagnosis of cyst of the liver or the mesentery was made but the exploration revealed a large retroperitoneal fluctuating tumor. The abdomen was closed on the assumption that a gigantic right hydronephrosis was present. Excretory urograms did not confirm the diagnosis and the patient was again operated upon 5 months after the first intervention. A cyst of the common duct containing 1,500 c.c. of bile was found. A probe introduced through the lumen of the cyst reached the duodenum. The posterolateral approach employed for the operation would offer technical difficulties to choledochoduodenostomy and therefore the author chose Matas' method of reconstruction of fusiform aneurysms. The postoperative course was uneventful and was not complicated by vomiting or any other digestive disturbance.

The etiology of a cystic dilatation of the common duct remains obscure but several factors may be considered, viz., congenital malformation, trauma or compression by a pregnant uterus, adenoma of the pancreas, and tuberculous infiltration of the mesentery. A cystic dilatation of the duct should not be confused with a diffuse dilatation of the duct which follows an obstruction by a gallstone, dystony of the sphincter, or compression by a tumor. The condition may become complicated by an infection of the biliary system.

Tumefaction and pains are the main symptoms, while jaundice is rare.

As to the treatment, external drainage or marsupialization should be avoided. Endocholedochorrhaphy is preferable to cholecystoduodenostomy because it preserves a normally functioning gall bladder. JOSEPH K. NARAT, M.D.

Cole, W. H.: Suppurative Cholangitis. *Surg. Clin. N. America*, 1947, 27: 23.

In most cases suppurative cholangitis probably starts in the extrahepatic bile ducts and tends to proceed upward into the liver, particularly if there is obstruction to the flow of bile; it rarely occurs when there is no obstruction. The most common bacteria producing the infection are the Escherichia coli, the Streptococcus, and the Staphylococcus. The infection is usually of a mixed type, although cultures taken at various intervals may not reveal all three of these bacteria at the same time.

Stone in the common duct is the most common type of obstruction giving rise to suppurative cholangitis, and is the one type which may clear spontaneously, because of the ball valve action of the stone. The obstruction due to stone is not as complete and persistent as most other obstructions. Carcinoma of the pancreas is not recognized as being a common cause of suppurative cholangitis, but the author has seen several cases in which this lesion was the etiologic factor. Stricture of the common duct almost always gives rise to suppurative cholangitis sooner or later. Usually stricture is secondary to trauma sustained at operation on the biliary tract. In a few instances it appears that there is an unusual type of inflammatory reaction which might be designated as obliterative cholangitis, which can produce serious obstruction. It is possible that on some occasions an abscess may develop postoperatively about the duct, thus giving rise to inflammation in the wall. Congenital cystic dilatation of the common duct may give rise to suppurative cholangitis, but not frequently because no antecedent infection exists. Regurgitation of the intestinal contents into the common duct or intrahepatic bile ducts can give rise to suppurative cholangitis. Infection will develop much more commonly in the presence of regurgitation if there is partial obstruction, although the author describes 3 cases in which suppurative cholangitis was produced by regurgitation in the absence of duct obstruction. Suppurative cholangitis is much less likely to develop if there is an appreciable amount of common duct intervening between the liver and the source of regurgitation in the intestine.

The initial source of the infection is probably in the wall of the common duct, although proof of infection may more readily be obtained from the presence of purulent material in the lumen of the common duct. Ascending infection through the sphinc-

ter of Oddi up the common duct can be excluded as a significant factor in the development of infection. After infection once develops in the wall of the common duct it tends to spread to the contents of the lumen and to progress upward into the liver, particularly if there is obstruction to the flow of bile. The wall of the common duct becomes thickened, edematous, and fibrosed. When the infection extends into the liver there is a tendency for the development of multiple liver abscesses. The contents of the common bile duct may or may not be frankly purulent. The presence of white bile indicates obstruction but is in itself no indication of the presence of infection. The bile retains a rather transparent glairy appearance until it is infected; after infection develops it becomes opaque, loses its opalescent appearance, and becomes thicker.

The clinical manifestations are:

1. Chills and fever. The chills vary greatly in frequency, and fever without chills is frequently present.

2. Jaundice and acholic stools. Since obstruction is usually present, jaundice is fairly constant. Jaundice may not be demonstrable at the time of the first symptoms of chills and fever. The stool may be acholic before jaundice is demonstrable in the skin. If the stool has a normal color, it may suggest that the obstruction is only partial or that it is intermittent.

3. Pain. The presence or absence of pain depends on the type of lesion producing the obstruction or infection. With very few exceptions the patient will complain of pain if the infection is secondary to stone in the common duct. If the infection is produced by stricture, pain is variable and, although usually present, it is usually of less intensity. When the condition is caused by carcinoma of the head of the pancreas, pain is not commonly encountered.

4. Nausea and vomiting. During the attacks of chills and fever, these symptoms are common, but they are uncommon between attacks.

5. Weakness and prostration. During the acute attack weakness is pronounced. If jaundice and fever persist beyond the acute attack, weakness will be still more pronounced.

6. Positive physical findings. Enlargement of the liver and mild tenderness in the right upper quadrant are present in the majority of cases, but muscle spasm is uncommon. The diaphragm may be elevated on the right. Tachycardia is fairly pronounced, the degree being dependent on the amount of fever.

7. The most pronounced positive laboratory finding is leucocytosis, usually of marked degree. Anemia is common. Examination of the urine and stool for bile is usually positive and negative, respectively.

Surgical drainage of the common duct is essential in the treatment of suppurative cholangitis. Penicillin cannot be relied on as the sole form of treatment, although it should be given and continued for several days after drainage is established. Streptomycin will probably prove to be much more effective than penicillin. If culture of the bile obtained by choledochostomy reveals the Escherichia coli, streptomycin is indicated in preference to penicillin. Sulfonamides are helpful but not as effective as these two drugs. Preoperative and postoperative care is stressed, and particular attention should be given to fluid and electrolyte imbalance and anemia. Drainage of the common duct with a T-tube is necessary, and attempts should be made to correct the obstruction, particularly if it is due to a stone in the common duct. If the patient is extremely sick, confirmation of patency of the lower end of the common duct by time consuming manipulations will not usually be necessary or justifiable. If an obstruction is present it can be corrected later.

Five cases of suppurative cholangitis due to various causes are described. Because regurgitation of food through the choledochoenterostomy opening occurs following anastomosis of a loop of jejunum to the hilar duct, the author no longer employs this procedure but uses a single arm of jejunum for the anastomosis, after the principle of Roux.

JOHN L. LINDQUIST, M.D

MISCELLANEOUS

Thorek, P.: The 6 Subphrenic Spaces. *Surgery*, 1947, 21: 739.

If subphrenic disease be kept in mind, especially as a complication of intra-abdominal suppurative processes, it can be diagnosed earlier and treated more effectively.

The subphrenic space is that which exists between the diaphragm above and the transverse colon and its mesocolon below. This area is divided by the liver into suprahepatic and infrahepatic portions. The suprahepatic part is bounded above by the diaphragm and below by the upper surface of the liver. The infrahepatic part is bounded above by the undersurface of the liver and below by the transverse colon and its mesocolon. Three suprahepatic and three infrahepatic spaces exist. The falciform ligament divides the suprahepatic area into right and left parts. The superior surface of the right lobe of the liver resembles an inverted cup or bowl, so that this surface appears both anteriorly and posteriorly. The cut section of the left lobe, however, resembles a chip, so that the dome shaped anterior and posterior relations of the superior surface are wanting. On the right side, the right lateral ligament, which is a prolongation of the coronary ligament, divides this area into two spaces, a large anterior and a small posterior one. These ligaments are peritoneal reflections. The left lateral ligament passes along the posterior border of the left lobe of the liver and separates the superior from the inferior surface. Therefore, only one space exists to the left of the falciform ligament. The three suprahepatic spaces thus constructed are named in the following way: space 1, which exists above the liver, anterior to the right lateral ligament and to the right of the falciform ligament, and is also called the right superior anterior subphrenic space; space 2, which is located to the right of the falciform ligament, takes in the

superior surface of the liver, and is behind the right lateral ligament, and is also called the right superior posterior subphrenic space; and space 3, which is situated between the liver and the left half of the diaphragm, and is also known as the left superior subphrenic space. The infrahepatic area is divided into right and left parts by the descending portion of the duodenum, although some anatomists use the ductus venosus for this division. The right inferior subphrenic space is located to the right of the duodenum and below the liver and is the same as the hepatorenocolic pouch of Morison. The left side of the infrahepatic space is divided by the stomach into anterior and posterior parts. This creates a space which exists to the left of the duodenum and in front of the stomach and, hence, is named the left inferior anterior subphrenic space. This also has been referred to as the perigastric space. The final, or sixth space, is situated to the left of the duodenum, below the liver but behind the stomach; it is known as the left inferior posterior space or the lesser peritoneal cavity (omental bursa). All of the spaces are intraperitoneal.

The space most frequently involved is the one which is the smallest and most difficult to reach, namely, the right superior posterior. This is due to the fact that the most frequent causes of subphrenic infection are on the right side, namely, acute appendicitis, acute cholecystitis, and perforated peptic ulcer. An inflammatory exudate from any of these three lesions may travel upward along the so-called paracolic groove of the ascending colon and localize in this space, which is the most difficult to reach surgically and causes the most difficulty in diagnosis.

The diagnosis of subphrenic abscess can usually be made if the condition is kept in mind. The inaccessibility of the subphrenic region also accounts for the delay in diagnosis, but there are many signs and symptoms which will suggest the possibility of this lesion. The onset may be abrupt or insidious, but the one outstanding finding is continuous fever. An unexplained fever which persists following a suppurative intraperitoneal process should at least suggest subphrenic abscess. The patient complains of pain or a sense of pressure in the upper abdomen or loin, which is usually aggravated by deep inspiration and thus may be confused with pleurisy or pneumonia. If an infection is present in the right posterior superior space, the pain may be referred to the lumbar region; however, the cases which involve the right anterior superior space or right inferior space usually have pain which is referred to the right costal margin.

Localized tenderness which is found over the involved region is of greatest diagnostic importance; however, its absence does not rule out subphrenic pathology. If an abscess is present in the right posterior superior space, the tenderness localizes over the right twelfth rib. By the same token, local tenderness is found along the costal margin, on the respective sides, in abscesses in the right anterior superior, the right inferior, the left superior, and the left anterior inferior spaces. The liver is displaced down-

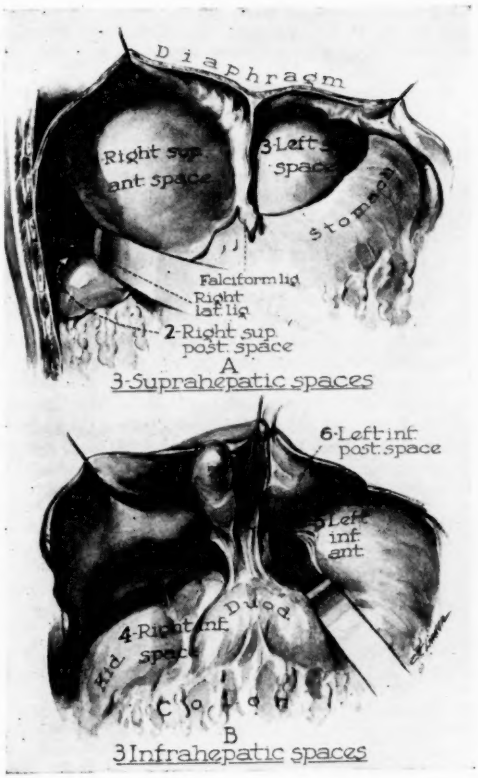


Fig. 1. (Thorek) a, The three suprahepatic spaces. The suprahepatic region is divided by the falciform ligament into right and left parts. Space No. 1 is situated to the right of the falciform ligament, above the liver and anterior to the right lateral ligament. It is therefore called the right superior anterior space. Space No. 2 is located to the right of the falciform ligament, above the liver and behind the right lateral ligament. It is called the right superior posterior space. Spaces Nos. 1 and 2 are separated from each other posteriorly by the bare area of the liver. Space No. 3 is found to the left of the falciform ligament and, since the left lateral ligament passes posteriorly along the flattened left lobe of the liver, there is only one space on this side in contrast to the two on the right. It is called the left superior space. b, The three infrahepatic spaces. The infrahepatic region is divided by the descending duodenum into right and left parts. For convenience these spaces have been numbered 4, 5, and 6. Space No. 4 is to the right of the duodenum, and below the liver. It is therefore called the right inferior space. This is the same as the hepatorenocolic pouch of Morison. Space No. 5 is found to the left of the duodenum, below the liver and in front of the stomach. It is called the left inferior anterior space. Space No. 6 is located to the left of the duodenum, below the liver and behind the stomach. It is called the left inferior posterior space or lesser peritoneal cavity. The arrow indicates its position and surgical approach.

ward and an area of increased liver dullness to percussion will be found in abscesses of the right anterior superior, the right posterior superior, and the left superior spaces.

Roentgenography is of great help if one emphasizes the importance of the fluoroscope instead of the x-ray plate. Although it is true that the diaphragm is elevated in subphrenic abscess, this in itself is not pathognomonic. On the other hand, immobility of the hemidiaphragm on the involved side is most suggestive of subphrenic pathology; this sign is of utmost importance and is most essential to the diagnosis. The presence of gas represents a late finding, hence, a neglected case; however, its absence, denoting a more favorable condition, does not eliminate the diagnosis of subphrenic abscess.

The use of aspiration for diagnosis is feared because of the danger of contaminating the pleural or peritoneal cavities.

Treatment is dependent upon the location of the infection and the presence or absence of suppuration. Since the majority of subphrenic infections do not go on to suppuration, they may be treated by conservative measures, especially by modern chemotherapy.

If the white blood count rises above 20,000, it is most suggestive of a suppurative process which will necessitate surgical intervention and drainage. It is of utmost importance to avoid contamination of uninvolved cavities in the drainage of such an abscess. This is imperative when the pleural and peritoneal cavities are concerned, since the marked absorbability of serous membranes might produce an immediate overwhelming toxemia. The ideal procedure, surgical approach, is an extraperitoneal one in which the abscess is approached either from in front or from behind, according to the location of the abscess. Since the right superior posterior space is the one most frequently involved, a "retroperitoneal operation" is usually performed. The only point which bears emphasis is based upon the work of Melnikoff who showed the variations and the relation of the costophrenic angle to the twelfth rib. This point is that the skin incision is made along the course of the twelfth rib, but the incision through the rib bed should change its course to a transverse one. The latter is made at the level of the spinous process of the first lumbar vertebra to avoid contamination of the pleural cavity. BENJAMIN GOLDMAN, M.D.

GYNECOLOGY

UTERUS

De Queiroz, A.P.: Review of 540 Cases of Genital Prolapse Observed at the Gynecologic Clinic of the Bahia School of Medicine Since its Creation until the Present Time; 1911-1946 (Revisão de 540 casos de prolapso genital observados na Clínica Ginecológica da Faculdade de Medicina da Bahia desde a sua criação Até hoje; 1911–1946). *An. brasil. gin.*, 1946, 11: 435.

During the 35 year period from 1911 to 1946, 540 patients, or 10.5 per cent of the entire material (5,142 patients) observed at the Gynecologic Clinic of the Bahia School of Medicine, presented genital prolapse. Sixty per cent had complete procidentia and 40 per cent, partial prolapse, or so-called descensus. The incidence of prolapse among white people was higher than that among the colored patients, the greatest frequency being observed in patients between 30 and 40 years of age. In 24 cases a concomitant lymphopathia venerea was present. Among the 540 patients, 10 were virgins and 19 were nulliparas. The condition occurred with the greatest frequency in multiparas with two pregnancies.

Of the great variety of operative procedures, the author favors Pozzi's hysterocolpectomy and Bouilly's operation, or the colpoperineal plastic operation with cervical amputation. JOSEPH K. NARAT, M.D.

Boveri, J. L.: Functional Surgery in Uterine Myoma (La cirugía funcional en el mioma uterino). *Rev. méd. Rosario*, 1946, 36: 784; 1947, 37: 39.

In the gynecologic section of the author's hospital up to the present there have been 1,453 surgical interventions on the uterus. In this material there were 352 postoperative complications. These included 109 (74.1 per cent) in 147 total hysterectomies, 100 (11.1 per cent) in 893 subtotal hysterectomies, and 68 (78.4 per cent) in 88 vaginal hysterectomies. The complications included 31 cases of bronchopneumonia (3 in the myomectomies), 17 of parotitis, 15 of operative shock, (15 with fever of unknown origin and 4 in the myomectomies), 13 cases of paralytic ileus, 13 of cardiac collapse (3 among the myomectomies), 11 cases of peripheral collapse, 6 of cardiac insufficiency, 13 of acidosis, and the remainder a variety of complications of lesser importance. The general mortality for this material is not discussed other than to mention that the mortality on the whole corresponded in incidence to the complications. Among the myomectomies there were 4 deaths. One of these deaths was the result of bronchopneumonia, 1 of cardiovascular collapse, 1 of embolism, and 1 of pneumonia.

The results obtained in these myomectomies are not discussed in detail since they have been reported by the author's associate, Bórras, in numerous articles. The author merely states in a general way that the immediate results in these patients have been satisfactory both from the psychic and physical aspects. The menstrual flow during the first 6 months following the operation has been rather abundant, lasting from 6 to 8 days, but amenable on the whole to the usual methods of therapeusis. Of the 213 myomectomized women in the last 6 years, 15 have become pregnant. Of these, 2 had previously been sterile, and some of them had been married but without children for as long as 12 years. Ten of these 15 patients delivered normally; 2 were delivered by cesarean operation. In these 2 there had not been any sign of a tendency toward labor, which led to the suspicion that the uterus had lost the proper disposition of its nerves and muscular structure for the initiation of labor. Three of the myomectomies were carried out during pregnancy. Of these, 1 terminated in spontaneous abortion and the 2 others went on to normal delivery.

The author believes that part of their excellent results are to be ascribed to Bórras' method of precautionary hemostasis which is illustrated in the original article.

The myometrectomy of Cirio, which was described by Cirio himself 2 years ago (*Obst. gin. lat. amer.*, B. Air., 1945, 3: 761) and abstracted in the INTERNATIONAL ABSTRACTS OF SURGERY (1946, 83: 52) is also illustrated, but no mention is made of any experience therewith. JOHN W. BRENNAN, M.D.

Heyman, J.: The Radiotherapeutic Treatment of Cancer Corporis Uteri. *Brit. J. Radiol.*, 1947, 20: 85.

Of 100 cases of cancer of the uterus referred to the Radiumhemmet for treatment, between 20 to 25 are cancer of the corpus. Hysterectomy is definitely not applicable to 80 per cent of the cases. It is true that the great majority of "corpus" cases are operable as far as the anatomic extent of the growth is concerned. However, many of these cases are bad operative risks because of old age, adiposity, heart conditions, and similar complicating diseases. Of 670 cases observed during the period from 1914 to 1939, inclusive, at the Radiumhemmet, the technically operable but clinically inoperable cases amounted to more than 50 per cent of the total.

The 5 year cure rate obtained by hysterectomy in cancer of the corpus is difficult to estimate. The relative 5 year cure rate in 4 reports involving series of 100 or more varies between 48 and 55 per cent.

At the Radiumhemmet a combined operative and radiotherapeutic treatment has been adopted; in this treatment radiotherapy plays the primary and most important part. Since 1930 a radiotherapeutic technique which is now used as a routine in the treatment of corpus cancer has gradually been elaborated. It involves packing the uterus with a sufficient number of radium containers to get the uterine cavity completely filled.

In packing, either tubes containing 8 mgm. of radium element or needles containing 10 mgm. of radium element, the filter of the wall being equivalent to 1 mm. of lead, are used. Each tube or needle is placed in an additional filter, the size of which varies according to the width of the uterine cavity, small filters being applied to small cavities and large filters to large cavities. Additional filters of 6 different sizes, each with a wall thickness equivalent to 2 mm. of lead, are used. The variation of the diameter of the additional filter is achieved by varying the air space between its external and internal wall. The irradiator ready for use consists of the tube, the additional filter, and a screw plug which fits all the filters and to which is attached the tube holder for insertion of the tube. For introducing the irradiators into the uterus a special applicator is used. One end of the applicator fits the screw plug; at the other end is a wedge and a clamping plate for securing the string during introduction. The technical skill required for application is not difficult to acquire. Accidents have been rare. In the total series of cases, at present amounting to about 1000, serious accidents have occurred 3 times; all of them were due to perforation of the uterus. The irradiators are removed by the nurse, and generally without any difficulty.

In most cases of corpus cancer at the Radiumhemmet, radiotherapy is the primary therapeutic interference. Two treatments are given, with an interval of 3 weeks. In 1 of the treatments, radium is also applied to the vagina in order to prevent vaginal metastases. Roentgen treatment is administered in such cases only when fixation of the uterus indicates that the growth has spread to adjacent organs.

Surgical interference is resorted to in case of failure of radiotherapy, which is indicated usually by repeated bleeding or increase in size of the uterus. There is no difficulty in removing the uterus after a properly conducted radium treatment. Even a subtotal hysterectomy will suffice in many of the recurrent cases and may be helpful in cases difficult to operate upon for one reason or another. Surgery may occasionally be resorted to as a primary interference, for instance, in cases of corpus cancer combined with large fibroids.

The irradiators remain in the uterus for a varying length of time, according to the amount of radium applied and to the type of irradiator used. On the basis of previous empirical experience, the dose of 1,500 element hours, given twice at 3 week intervals, has been adopted as the most suitable one when 10 irradiators each containing a tube of 8 mgm. of radium element and with an additional filter of medium size are used.

At each treatment the patient remains for 4 or 5 days in the hospital.

The results are given in Table 1.

For the 205 patients treated in the period from 1934 to 1939, the relative cure rate is 64.9%.

The results in different groups were as follows: clinically operable, 67 per cent, 5 year cures; technically operable, 48 per cent cures; and inoperable, 28.7 per cent cures. DANIEL G. MORTON, M.D.

TABLE I.—THE 5 YEAR RESULTS IN CASES TREATED FROM 1914 TO 1939 INCLUSIVE

Total number of patients examined	698
No. of patients alive without evidence of the disease	363
Absolute cure rate	52.0%
Number of patients treated	670
No. of patients alive without evidence of the disease	363
Relative cure rate	54.2%

Lipin, T., and Davison, C.: Metastases of Uterine Carcinoma to the Central Nervous System; A Clinicopathologic Study. *Arch. Neur. Psychiat.*, Chic., 1947, 57: 186.

The author notes that metastases of carcinoma of the uterus to the central nervous system are infrequent. These metastases are often solitary and may occur in the absence of widespread disease. In cases of a single metastatic nodule in the brain without evidence of carcinomatosis, the advisability of neurosurgical intervention should be considered, for in selected cases life may be prolonged appreciably by operation.

Three cases of metastatic brain tumor from uterine cancer are reported in detail, in all of which the primary growth was adenocarcinoma of the fundus. In addition, 2 cases of metastatic tumor of the brain from carcinoma of the uterus are summarized from the literature because they illustrate important points. The first case presented by the author illustrates that carcinoma of the uterus may give rise to a solitary metastasis to the brain in the absence of metastases to other organs. The second case reveals that evidence of carcinomatosis appeared 5 years after the patient had a hysterectomy for a uterine adenocarcinoma. Although there were multiple metastases to many organs, only a single metastatic nodule was observed in the brain. In the third case a single metastasis to the central nervous system occurred in a patient with carcinomatosis secondary to a malignant growth in the uterine fundus.

In a discussion of therapy, the author notes that neurosurgical intervention is contraindicated in most cases of metastatic tumor of the brain secondary to uterine carcinoma because of the frequent accompaniment of carcinomatosis, but when there is not evidence of this complication and when signs suggest a solitary brain tumor, neurosurgical intervention may prolong life.

In conclusion the author notes that metastases from carcinoma of the uterus probably account for 1 to 3 per cent of all carcinomas of the central nervous system. The percentage of uterine carcinomas metastasizing to the central nervous system varies from 0.1 to 3.4 per cent, according to different sources.

Carcinoma of the breast, lung, pharynx, sinuses, thyroid, and adrenal glands may metastasize more frequently to the central nervous system than carcinoma of the uterus, whereas carcinoma of the stomach, urinary bladder, pancreas, and esophagus may metastasize less frequently. There is evidence that metastases to the central nervous system from uterine carcinoma are often solitary.

Uterine carcinoma may metastasize to the central nervous system in the absence of carcinomatosis. In cases in which metastasis to the central nervous system from a carcinoma of the uterus is suspected, neurosurgical exploration is indicated only if there is no evidence of multiple metastases to the brain or spinal cord and no evidence of carcinomatosis.

HERBERT F. THURSTON, M.D.

Ahltorp, G.: On Conservative Myomectomy. *Acta obst. gyn. scand.*, 1946, 26: Supp. 6.

The author presents an exhaustive study on the subject of myomectomy, the first 78 pages of which are devoted to a survey of the literature. He has felt justified in subjecting the views expressed in these monographs to a detailed and rigid scrutiny since he believes, from previous studies, that no conclusive proof of the relative advantages and disadvantages of myomectomy has so far been adduced. Statistics, in Sweden, for the years 1925, 1930, 1935, and 1940 reveal an increase in the relative frequency of myomectomy in the special clinics, and operations of this kind were commoner in the special clinics than in the local hospitals.

A detailed description is given of the method of enucleation employed. At the conclusion of the operation it is customary to insure ventral fixation of the uterus seroserously against the anterior abdominal wall. In the author's series, 18 of the patients who had undergone ventral fixation later became gravid. In 14 instances pregnancy proceeded to term; miscarriages occurred in 4 cases.

The author's material comprises 282 abdominal myomectomies and 46 vaginal myomectomies, and 92 per cent of the patients were operated upon by the same surgeon.

Multiple fibroids occurred in 69 per cent of the patients. In the majority of cases solitary fibroids were treated by enucleation, while multiple fibroids were treated by radical operation. The greatest number of tumors removed in a single case was 30. Solitary fibroids were commoner in patients who had previously undergone a pregnancy, while multiple fibroids were found more frequently in sterile patients.

The majority of patients treated by enucleation were young; the reverse was true of those who were treated by radical operation. Menorrhagia, pains and sterility, in the order named, were the most frequent indications for operation. The sizes of the enucleated fibroids varied within wide limits. There seemed to be no relation between the size and the number of fibroids, between the size of the fibroids and a preceding pregnancy, the size of the fibroids and the age of the patient at operation, nor between the size of such tumors and their position in the uterus.

Necrosis occurred in 20 per cent of the cases and was more common among gravid patients. This did not constitute a contraindication to enucleation. The sedimentation reaction provided no certain clue as to the presence of necrosis.

Adenomyomas occurred in 5 per cent of the patients treated by enucleation. Not a single instance of sarcoma was discovered among the patients in whom abdominal myomectomy was performed. In 3 cases cellular leiomyomas were diagnosed. A diagnosis of sarcoma was made in 1 of the 46 cases in which vaginal myomectomy was performed. Of the 572 patients who had undergone radical operation for fibroids, a postoperative diagnosis of sarcoma was made in 2 cases. If all cases are included, the incidence of sarcoma in 902 cases of fibroids is 0.55 per cent. In not one of the cases in which enucleation was considered was it necessary to abandon this method of treatment because of coexistent cancer in the uterus, although cancer was found in 1 case in which radical operation had been performed.

Although the uterine cavity was usually left unopened during enucleation, it was explored in 16 per cent of the cases. It is believed that exploration of the uterine cavity may be justified in certain cases.

Excision of the myoma capsule in myomectomy was carried out only in exceptional cases.

Changes in the adnexa or pelvic peritoneum were registered in 48 per cent of the 282 cases in which enucleation was accomplished, and in 46 per cent of the cases in which radical operation was carried out. It is not rational to limit enucleation strictly to those cases in which the appendages are completely normal.

Complications during enucleation arose in only 3.5 per cent of the cases. The most common complication was hemorrhage during and after enucleation. All patients recovered. Variations of temperature after myomectomy were, on the average, moderate.

Postoperative involution appeared to be complete after a period of a few months and the uterus was eventually restored to its normal size and shape.

Not a single postoperative death is recorded among the 282 patients subjected to abdominal myomectomy. One reason for this may be that patients subjected to enucleation are usually good subjects for the operation. The death rate attending 572 radical operations was 2 per cent. Any direct comparison between the death rate in the two groups must be misleading, since the radical operation is applicable to older age groups and to more complicated cases than those found in the conservative group.

Two hundred and fifty-five patients (90%) who underwent enucleation showed a postoperative sequence free from all complications. Serious complications arose in only 5 per cent of the cases. Complications associated with healing are believed to be somewhat more common after radical operation than after abdominal myomectomy. The postoperative

sequence does not appear to be unfavorably influenced by the enucleation of necrotic or large fibroids, by exploration of the uterine cavity in the course of enucleation, nor by chronic inflammation of the tubes, and abdominal wound healing is better than that following radical surgery.

Enucleation was performed during pregnancy in 14 cases—before term in 11 patients and in conjunction with cesarean section at term in 3. Of the 11 cases, 6 pregnancies were maintained and 5 were arrested. Partial myomectomies were performed in 8 patients, 7 of whom were pregnant.

Of the 282 patients subjected to enucleation, 15 per cent desired treatment for sterility; however, sterility did not constitute the main indication for operation.

A variety of factors determine the suitability, or otherwise, of conservative treatment in a given case of fibroids: the age of the patient, the number of fibroids, and their location in the uterus, the delimitation of the tumor from the surrounding myometrium, the condition of the ovaries and tubes, together with the patient's case history and individual preferences in the matter of a radical or conservative procedure. In many instances the final choice cannot be made until the operation is actually in progress.

As a result of re-examination of the patients, it was found that of 161 women who had undergone enucleation, 75 per cent were free from recurrence; 167 patients (78%) were found to be symptomless and 47 patients complained of various disabilities, the commonest being menorrhagia and dysmenorrhea .The symptoms were alike both in patients with recurrence and in those free from recurrence.

While enucleation sometimes results in a reduction of the quantity and duration of the menstrual flow, some patients find that their menorrhagia is unaffected by enucleation, and in these it is believed that myomectomy might well be supplemented by curettage of the uterine mucous membrane. About three-fourths of the women subjected to myomectomy were found to be free from menstrual pains after operation.

Of the 93 patients subjected to enucleation, who were in condition to conceive after operation, 31 per cent became pregnant. The mothers in question gave birth to 36 living infants and 1 stillborn infant. On the whole these pregnancies followed a normal course. Spontaneous deliveries occurred in 29 of 36 patients; in 5 cases forceps were applied and in 1 case cesarean section was performed. The majority of these patients were old primiparas. All of the mothers survived delivery.

There is no substantial evidence to suggest that pregnancy and labor are especially influenced by the number of fibroids shelled out, by their size, or by the opening of the uterine cavity in the course of enucleation. The interval between enucleation and conception is often remarkably short. Of 31 intrauterine first pregnancies occurring after enucleation, 23 (74%) proceeded to term.

Certain cases of pregnancy helped to clarify the possible influence of uterine fibroids on sterility. In 5 of the patients, sterility had persisted for a period of from 3 to 15 years, and these patients became pregnant within a year of the operation. Here, in all probability, sterility was cured as a result of myomectomy. Pregnancy developed later in only 3 of the 8 patients in whom a salpingostomy had been performed. In only a single instance did pregnancy develop following vaginal myomectomy.

T. Floyd Bell, M.D.

ADNEXAL AND PERIUTERINE CONDITIONS

Guillemin, G., and Mousselon, J.: Etiological Investigation into Adnexal Tuberculosis during the War Years. Clinical and Therapeutic Deductions Concerning 80 Recent Observations (Enquête étiologique sur la tuberculose annexielle pendant les années de guerre, déductions cliniques et thérapeutiques A propos de 80 observations récentes). *Lyon chir.*, 1947, 42: 79.

During recent years, the authors have noted an alarming increase in adnexal tuberculosis. They attribute this increase to hard living conditions, physical strain, and added responsibilities placed upon women as a result of the war and its consequences.

Formerly, tuberculosis in the adnexa was a rarity, few cases being encountered from year to year. During the 7 year period from 1932 to 1939, inclusive, only 20 cases were observed in the hospital and private clinic of Cotte but during the 6 year period from 1940 to 1945, inclusive, 50 cases were treated in the hospital and 30 cases in the private clinic of Cotte, a total of 80 cases. The condition quadrupled itself in the last named period.

In all of the 80 cases the tuberculous nature of the lesion was proved. In 44 cases there was positive anatomopathologic proof. In 3 cases there was positive bacteriologic proof, the bacillus of Koch being identified in the pus from the lesion or by guinea pig inoculation. In 33 cases, antecedent tuberculous lesions in other parts of the body and verification of tuberculosis at the time of surgical intervention afforded sufficient proof so that anatomopathologic and bacteriologic proof was superfluous.

Adnexal tuberculosis was found to occur most often in young women; of the 80 patients, 6 were less than 20 years, 40 were between 20 and 30 years, 28 between 30 and 40 years, and 6 were more than 40 years of age.

A majority of the patients had shown evidence of tuberculosis in other parts of the body before they developed trouble in the adnexa. Twenty-one of the 80 (25%) had shown pleuroperitoneal tuberculosis, 3 had had tuberculosis of the pulmonary parenchyma, and the remainder had had cervical adnexitis or renal tuberculosis.

The disease was found most often in young married women, especially those who had borne children. Cases of adnexal tuberculosis are presented by the authors to show that married life and childbirth

played an important part in producing acute adnexitis in young women who had either arrested or latent tuberculosis in other parts of the body.

Married women, complaining of sterility, showed evidence of an old pleurisy and an apparent secondary genital tuberculosis responsible for the condition from which they sought relief.

From the clinical viewpoint, the symptoms of which the patients complained were varied. Of the 80 patients treated, 18 with acute conditions presented signs of antecedent tuberculosis. In 5 the pain and generalized symptoms were severe on account of the presence of a large abscess in the pouch of Douglas and immediate colpotomy with drainage of the abscess was necessary. Examination of the pus thus obtained afforded the demonstration of Koch's bacillus to clinch the diagnosis of tuberculosis of the adnexa.

The 62 chronic cases presented such symptoms as lumbar or pelvic pain without fever (22 cases), dysmenorrhea (15 cases), menstrual irregularities (10 cases), sterility (16 cases), and postoperative appendectomy fistula (1 case). Pain at the menstrual period or pain between the periods was the most constant symptom. The pain had been present over a long period of time, originating in the lower abdomen and radiating to the lumbar and crural regions. Often the pain was mistaken for that originating from an acute appendicitis and only when appendectomy was performed was the true nature of the disease recognized.

For the most part the menstrual disorders complained of were metrorrhagia of ovarian origin, varying in intensity. One patient had been amenorrheic for 6 months, when the acute symptoms occurred.

Sterility, which resulted from cicatrization of the pelvic organs, was usually asymptomatic. Latent tuberculosis was found in these cases.

One patient, 19 years old, married, and without antecedent tuberculosis, sought relief from a right iliac fistula following an operation for acute appendicitis, performed 6 months before entry into the hospital. At the time of the operation a large right iliac abscess, an abscess of the right ovary, and bilateral pyosalpinx were found.

In general the surgical treatment of these cases was as conservative as possible. All interventions were carried out through an abdominal incision.

Eighteen cases were operated for the relief of acute adnexitis and pelviperitonitis, the bacteriological nature of the disease not being recognized prior to operation. In 2 cases simple laparotomy was done, in 3 cases unilateral castration was done, in 2 cases bilateral castration was done, in 7 cases the uterus with one or both ovaries was preserved, in 2 cases subtotal hysterectomy was done, and in 2 cases total hysterectomy was done. Of the 18 patients, 4 died soon after the operation, while 2 died some months after the operation, a mortality of 30 per cent.

On the basis of their experience, the authors advise that in such acute cases surgical intervention should be delayed, and expectant treatment, heliotherapy, and improved living conditions until the patients' general condition has improved sufficiently to undergo operative treatment are indicated.

In chronic cases the surgical risk is not so great. Conservative surgery and avoidance of useless mutilations eliminate the disturbing physical and psychical sequelae attendant upon castration. In cases of unilateral involvement, which are rare (only 4 of the 62 chronic cases were unilateral), the chances for obtaining good results are more favorable. The operations performed on these 62 chronic cases were simple laparotomy (16), unilateral castration (4), bilateral castration (2), conservation of the uterus and of one or both ovaries (35), total hysterectomy (1), and repair of the cornua (4). At the time of surgical intervention, 20 resections of the presacral nerves and 20 appendectomies were done. These operations were done to eliminate postoperative dysmenorrhea and discomforts due to chronic appendicitis. In other cases peritonization with freeing of the vesical peritoneum was performed; this had the double advantage of fixing the uterus in good position, thereby preventing secondary retroversion, and promoting as complete peritonization as possible to cover the raw surfaces of the pelvis.

In the majority of the cases, there was a postoperative gain in weight, disappearance of fever, and, in cases in which the uterus was retained, a more normal menstruation.

Fifty-two of the 80 cases operated were followed up later. One patient in whom the presacral nerves were not resected complained of dysmenorrhea. Two patients remained amenorrheic in spite of the conservative operation.

There were no deaths among the chronic cases. The immediate postoperative results were so good that in some cases the authors regretted not having done a more radical operation.

BLACKWELL MARKHAM, M.D.

Llusiá, B., and Ibáñez, A. S.: Studies regarding Ovarian Adnexitis (Estudios sobre el ovaria anexítico). *Rev. españ. obst.*, 1946, 3: 1.

The object of the authors' work was to see what effect adnexitis has on the ovaries.

The first manifestation is an alteration of the menstrual cycle caused, most likely, by some ovarian destruction due to an oophoritis or abscess formation. Changes observed because of inflammation of the adnexa in order of their frequency were: dysmenorrhea (171), polymenorrhea (48), hypermenorrhea (45), metrorrhagia (41), menorrhagia (22), amenorrhea (20), and oligomenorrhea (8). These were found in the study of 1,000 patients.

The etiologic factors productive of these changes were predominantly gonorrhea and abortion. Other causes, but of negligible proportion, were puerperal fever, appendicitis, lacerations, and prolapse.

Sterility secondary to adnexitis was found to be as high as 36 per cent and 12 per cent of these cases had no other symptom. STEPHEN A. ZIEMAN, M.D.

Douglass, M.: Masculinizing Tumor of the Ovary of the Adrenal Type. *Am. J. Obst.*, 1947, 53: 190.

A case of masculinizing tumor of the ovary is reported. A 48 year old white woman had complained of backache, lower abdominal pain, and vaginal discharge for a period of 7 years. Two years previous to her admission to the hospital she developed a loss of scalp hair, generalized hypertrichosis necessitating daily shaving of her facial beard, and a bass tone to her voice. There was a loss of libido, and intercourse became painful. The menses had ceased at 37 years of age. Examination revealed a slight hypertension, a male facies, alopecia, generalized hypertrichosis, bass voice, and male type of breasts. The hemoglobin was 115 per cent and the erythrocyte count 6.0 million. The leucocyte count was 9,000. Pelvic examination showed the clitoris to be greatly hypertrophied, the uterus to be smooth, firm, and slightly enlarged, and a definite tumor to be present in the region of the right ovary.

At operation the right ovary was 4 cm. in diameter, smooth, oval, and light yellow in color. A subtotal hysterectomy, bilateral salpingo-oophorectomy, and perineorrhaphy were performed. Near the center of the right ovary was a light brown, firm, fleshy tumor mass 1.4 by 1.2 by 0.8 cm. Sections of this tumor showed strands of adrenal-like cells in an irregular arrangement. There was no acinous or tubule formation.

This patient was followed up for a period of 2 years and has shown a complete reversion to the feminine characteristics. A slight facial hirsutism has persisted. The pelvis is normal. Hormone tests for androgens revealed only a high elevation of the normal female values. The author presents the evidence pro and con as to whether these tumors are of adrenal or ovarian origin, and believes that this case is typical of a proliferation of an adrenal rest.

JOHN R. WOLFF, M.D.

Block, E.: Primary Carcinoma of the Fallopian Tube. *Acta radiol.*, Stockh., 1947, 28: 49.

Primary cancer of the fallopian tube is a rare disease. A report from the Radiumhemmet shows that from 1922 to 1945 only 16 such cases were admitted, less than 1 case per year.

Since the Radiumhemmet presents a larger series of cases than any hitherto reported, and since the postoperative radiation therapy has been given according to practically unchanged methods, the publication of this material is justified even if nothing especially new can be expected regarding the pathology and clinical course of cancer of the tube.

According to obtainable information in the literature, 379 cases have been reported since Renaud, in 1847, first described primary cancer of the fallopian tube. In 1932 Nurnberger, in his textbook, tabulated the 301 cases which had been published up to that time. In 30 per cent of these cases, the carcinoma was stated to be bilateral. In most of the cases it was impossible to determine whether the growth was primary or secondary. The incidence was greatest in the age group from 45 to 50, but cases have been reported at such an early age as 18 and at the advanced age of 73.

The etiology of cancer of the tube does not differ from that of cancer in other organs, although the cancer generally starts in the fimbriated end of the tube.

Like carcinoma of the ovaries, the tubal cancer long remains latent. Pain is reported to be the most common symptom.

In the presence of a mass in the adnexa, the serosanguineous discharge is pathognomonic of carcinoma of the fallopian tube, provided conditions in the uterus and the vagina are normal.

In cases of tubal cancer, bleeding is not a constant symptom.

The treatment is surgical, namely, removal of the adnexa. Some authors have suggested hysterectomy. However, in so doing they have not considered the desirability of retaining the uterus for postoperative radium application.

Of the 22 cases mentioned, only 3 had been treated with radium; the 19 others were treated by roentgen irradiation only.

A brief report is given of the 16 cases treated at the Radiumhemmet. Of these 16 cases, 6 were definitely primary, while the remaining 10 were probably so. However, 16 cases are too small a number for a statistical study.

At the Radiumhemmet the radiological treatment of tubal cancer has followed practically the same principles as that of cancer of the ovary, namely, 1 intrauterine or vaginal radium application followed by roentgen treatment to 2 anterior and 2 posterior fields. The radium dose has varied: in the uterus from 990 to 1,500 mgm. hours and in the vagina from 1,800 to 3,000 mgm. hours. The roentgen dose has varied also. In later years, however, 3 doses of 400 roentgens are administered to each of 4 fields in the first series, followed 3 months later by a second series of 2 doses of 400 roentgens to each field.

Tubal cancer is not a hopeless disease provided that a radical operation is performed early and that radiation therapy is administered in accordance with the aforementioned method.

HARRY W. FINK, M.D.

MISCELLANEOUS

Hite, K. E., Hesseltine, H. C., and Goldstein, L.: A Study of the Bacterial Flora of the Normal and Pathologic Vagina and Uterus. *Am. J. Obst.*, 1947, 53: 233.

The authors report the results of a study of the bacterial flora of the vagina in 248 patients during pregnancy and following delivery. Sixty-one of the patients were normal prenatal cases, 73 were pregnant women who had trichomoniasis, clinically, and 21 were patients with other types of vaginitis during pregnancy. In addition, uterine cultures were obtained during the puerperium from 50 normal patients and 45 pathological cases.

The flora of normal pregnant women revealed the most frequent members to be aciduric rods, diphtheroid rods, Staphylococcus albus, and fungi. Nonhemolytic and anaerobic streptococci were isolated frequently. Other organisms were seen only occasionally or not at all. There was no difference between cultures obtained during the first half and second half of pregnancy.

In the patients with trichomoniasis there was an increased frequency of aerobic and anaerobic streptococci bacteroids, and a lower percentage of aciduric rods. Moniliasis was common in patients with other types of vaginitis.

The uterine cultures obtained from both normal and febrile postpartum patients were remarkable in their similarity. The authors emphasize that the presence of large numbers of various types of organisms makes it difficult to determine the causative organism in infection and thus the effect of treatment must be judged accordingly. They also point out that the postpartum uterus and vagina may be the portal of entry for a more diffuse infection.

JOHN R. WOLFF, M.D.

Schmitz, H. E., and Towne, J. E.: Radium and Roentgen Therapy in the Treatment of Menopausal Uterine Bleeding. *Am. J. Obst.*, 1947, 53: 199.

The control of functional climacteric uterine bleeding presents a problem in which there is no uniform consensus. In view of the multitude of methods of treatment proposed for benign uterine bleedings, it is apparent that each type of treatment has definite indications and limitations which should not overlap one another. The authors report 412 cases, observed during the five year period from 1939 to 1943 at the Mercy Hospital, Loyola University Clinics, Chicago, in which uterine hemorrhage was the indication for radiation therapy.

One hundred and sixteen (28 per cent) of the patients received roentgen ray treatment, and 296 (71 per cent) had radium therapy. The authors prefer the latter since curettage always precedes it, and subsequent treatment is rarely needed. The indications for this type of therapy are essentially the symptoms of profuse or irregular vaginal bleeding in the presence of normal pelvic findings. The authors show the excellent results that can be obtained in the treatment of menopausal bleeding by this simple method of treatment. The dangers are exceedingly small and the complications following treatment are minor. JOHN R. WOLFF, M.D.

De Aquino Salles, A., and Couri, A. A.: Simultaneous Bilateral Ureteroenteroanastomosis according to Davalos' Technique in the Treatment of Incurable Vesicovaginal Fistulas (Uretero-êntero-anastomose bilateral simultânea pela técnica de Davalos, no tratamento das fístulas vésico-vaginais incuráveis). *An. brasil. gin.*, 1946, 22: 263.

Two cases of vesicovaginal fistula treated by a bilateral simultaneous ureterointestinal anastomosis are reported by the authors who believe that possibly their patients were the first on whom this method was employed. The main principle of the operation is the formation of a valve for the protection of the anastomosis and ureters against ascending infection. The method offers the following advantages:

1. The superior and inferior mesenteric arteries remain preserved.
2. Only one incision is made through the sigmoid and in this manner trauma is reduced.
3. The transverse incision across the sigmoid allows the formation of a valve.

Sulfasuxidine administered orally has proved of inestimable value in the preoperative and postoperative care. Briefly, the technique is as follows:

The abdomen is opened through a midline incision. The ureters are mobilized and divided. A transverse incision is made through the serosa and muscularis of the sigmoid and is supplemented by a lateral incision; the ends of the ureters are cut on a bevel and sutured to the submucosa without tension. The serosa and muscularis are sutured over the ureters. Mattress sutures through the serosa and muscularis draw the lower edge of the incision over the ureters. The submucosa and mucosa are incised to allow the ends of the ureters to enter the bowel. Finally, the edges of the serosa and muscularis are inverted.

Transient anuria, probably resulting from an edema of the distal end of the ureters, was present in both cases on the third postoperative day but it subsided after a short while. The immediate postoperative results were very good. Intravenous urography showed the presence of hydroureters shortly after implantation but the condition gradually disappeared. JOSEPH K. NARAT, M.D.

OBSTETRICS

PREGNANCY AND ITS COMPLICATIONS

Chesley, L. C., and Annitto, J. E.: Pregnancy in the Patient With Hypertensive Disease. *Am. J. Obst.*, 1947, 53: 372.

The authors' experience with pregnancy in women with hypertensive disease is presented because there are relatively few such studies based upon any considerable series, and in most studies extant there has been a selective factor in that therapeutic abortions have been done in the more severely hypertensive patients.

From 1931 through 1944 there were 218 women at the Margaret Hague Maternity Hospital, Jersey City, N. J., in whom the diagnosis of hypertensive disease as defined by the American Committee on Maternal Welfare could be established, and an analysis was made of the 301 pregnancies of these patients.

The gross fetal loss in prior pregnancies was 35 per cent; in the first hypertensive pregnancy, 38 per cent; and in subsequent pregnancies, 40 per cent. Fetal loss increased with higher initial blood pressure, second trimester rises in the blood pressure, higher pressures near delivery, decreased renal function (normal in 93% of the pregnancies), proteinuria, and superimposed toxemia.

There were 6 immediate maternal mortalities (2%) and 7 late puerperal deaths. Eight deaths were probably associated with the hypertensive disease, while 5 were attributable to intercurrent causes. All late puerperal deaths are known to be included since all patients were traced. The authors conclude that while pregnancy very definitely jeopardizes the hypertensive woman, the hazards are not great in 2 of 3 cases, as two-thirds escape superimposed toxemia.

Nearly 40 per cent of the women showed drops in the blood pressure in midpregnancy, a point of practical importance for diagnosis inasmuch as a diagnosis of pre-eclampsia may be made if the earlier hypertensive pressures are unknown. Also, this factor confuses the interpretation of permanent hypertension apparently left as a sequel of pre-eclampsia.

JOHN R. WOLFF, M.D.

Grasset, J.: A Study of the Pathogenesis and Mechanism of the So-Called "Toxic" Accidents of Gestation (Contribution à l'étude de la pathogénie et du mécanisme des accidents dits "toxiques" de la gestation). *Rev. fr. gyn. obst.*, 1946, 41: 369.

Two clinical observations of eclamptic attacks in pregnant women and a series of experimental studies on the guinea pig form the basis for some tentative suggestions concerning the pathogenesis and modus operandi of the eclamptic state. These observations were made before World War II. The data therefrom were compiled by the author while a prisoner and are presented without further documentation or revision.

The first observation was that of a severe case of eclamptic convulsions with deep continuous coma. The convulsive seizures were uncontrolled by chloral or morphine but the blood pressure of over 200 mm. Hg was practically completely controlled by combined medication with calcium gluconate and hyposulfite of magnesium. The child died during the period of medication.

The other observation was that of a woman with a 5 months' pregnancy who was thrown into a typical eclamptic state, with blood pressure of 180–100, convulsive seizures, and coma. The condition was immediately ameliorated as a result of artificial emptying of the uterus, at the end of pregnancy, of a living child.

In an attempt to understand the dramatic effects of the combined calcium-magnesium medication and the apparently noxious action of the hypophyseal extract a series of experiments were conducted on guinea pigs. The first experimental series consisted of injections of 10 units of extract of the posterior lobe of the hypophysis into the left ventricle of the heart. This did not produce any accidents of the eclamptic type. Nor were any convulsive seizures elicited by injections of 2 c.c. of serum or spinal fluid from eclamptic women. No typical seizures were produced by combined intracardiac injections of extract of the posterior lobe of the hypophysis and of the serum of the normally pregnant woman. However, when the guinea pig was first sensitized by intracardiac injections of distilled water, followed 2 days later by 10 units of the extract, there resulted some suggestion of convulsive attacks with other symptoms of anaphylaxis and death in 3 to 5 hours. Twenty units of the post-hypophyseal extract produced intense convulsions with death of the animal in a half hour. The same effects, only more intense, were produced by sensitizing the animal with the serum of the normal pregnant woman and injecting the extract of the posterior lobe of the hypophysis after 7 days. The severity of the attacks was proportional to the quantity of serum used. When the serum used was that of an eclamptic woman or a hypertensive pregnant woman the manifestations were much stormier with death in 3 minutes. Thus, an anaphylactic reaction might explain the reactions were it not for the gradations in severity with the different sensitizing media.

The author believes that the posterior lobe of the hypophysis is not of itself able to produce the eclamptic state, that a sensitization of the organism is required, that this sensitization comes from the foreign protein effects of the fetus, and that the upset comes by way of the neurovegetative, particularly the vagosympathetic, system. Thus, the calcium-magnesium salts as the regulator of the neurovegetative system are able to bring about dramatic relief.

JOHN W. BRENNAN, M.D.

Whitacre, F. E., Loeb, W. M., Jr., and Chin, H.: Eclampsia. *J. Am. M. Ass.*, 1947, 133: 445.

The authors define this disease of pregnancy as probably related to nutritional deficiencies and characterized by a syndrome of symptoms and distinct pathologic lesions which are associated with angiospasm.

The present report comprises data on 100 consecutive eclamptic patients from the obstetric and gynecologic service of the Peiping Union Medical College Hospital, Peiping, China, observed during the years from 1935 to 1941. These cases are compared with those of 100 consecutive eclamptic patients from the department of obstetrics and gynecology of the University of Tennessee at Memphis, observed during the years from 1941 to 1945. All the patients from Peiping were Chinese, while in the Memphis series, 96 were negro and 4 were white. The assertion by numerous authors that eclampsia is a disease of primiparas is borne out by the authors' cases; in the Chinese series 75 were primiparas and 25 multiparas, while in the Memphis group 72 were primiparas and 28 multiparas.

With regard to the appearance of convulsions in relation to the labor, in 75 of group 1 the convulsions were antepartum, in 10 intrapartum, and in 15 postpartum, while in 77 of group 2 they were antepartum, in 6 intrapartum, and in 17 postpartum. The stage of gestation conformed to the reports of others, as in 98 patients in group 1, and 99 patients in group 2, eclampsia occurred after the sixth month of pregnancy. In both groups the disease occurred among the underprivileged or indigent, who could be expected to have nutritional deficiencies.

It has been noted that the duration of hypertension might be more important than the severity of the disease; that is, the patient with an elevation of blood pressure which had been existent for several weeks might suffer permanent renal damage, even though convulsions did not occur. However, in a rapidly developing toxemia which lasted only a few days, even though attended with convulsions, there might be no permanent damage to the kidneys.

A study of the data contained in this report brought out several factors. Race did not seem to be significant. There was no appreciable difference in the two groups with regard to the ages and parity of the patients concerned. The stage of gestation was almost identical. The blood chemical findings are very similar, and the lower blood pressures in group 1 are in accord with the low blood pressures which are found in general among the Chinese. The high incidence of eclampsia among the Chinese is significant, and the incidence in the Midsouth is unusually high. This high incidence will be reduced only when the public is better informed on the benefits of prenatal care, which includes advice in regard to a properly balanced diet during pregnancy. The mortality rate among eclamptic patients in either Peiping, China, or Memphis, Tennessee, does not compare favorably with the mortality reported by others.

Figures on the red blood cell counts and hemoglobin determinations are somewhat lower than those commonly reported. In the toxemic group they are difficult to evaluate because of the blood dilution of pregnancy and the blood concentration associated with the toxemias. Total plasma protein determinations were not significant except when appreciably lowered.

Electroencephalographic tracings were made on 6 eclamptic patients during convulsions. All the tracings are similar, but those used in this report were more clear-cut. It is significant that an eclamptic patient treated with veratrum viride gave the same type of tracing. One might contend that the alteration in the tracings is the result of the fall in blood pressure, and this is probably correct, for the fall in blood pressure is due to the relief of angiospasm, whether by the use of regional nerve blocking or by the action of a drug, such as veratrum viride.

It seems reasonable to conclude that angiospasm is probably both the immediate basis for the syndrome of eclampsia, accounting for the gradual or sudden rises in the blood pressure and the suppression of urinary excretion, and the exciting cause of the convulsive seizures in some patients. The placenta is probably the stimulating factor in the patient's production of pressor substances. Methods of medical management rely for their success on the relaxation of angiospasm directly or indirectly.

CHARLES BARON, M.D.

LABOR AND ITS COMPLICATIONS

Brouse, L. T.: Hemorrhage following Gestation (Hemorrhagias consecutivas a la gestosis). *Obst. gin. lat.-amer.*, 1946, 4: 749.

Brouse believes that during labor, uterine inertia in the eclamptic is brought about by toxic cellular edema, the excessive interstitial fluid so disorganizing the muscle fibers that atony results. In fact, it is intimated that the occurrence of uterine atony augurs a previous eclampsia. Moreover, in such uteri, intractable hemorrhage is so certain in the majority of instances that oxytocics, massage, transfusion, and stimulants may be ineffectual, and, unless hysterectomy is done, acute anemia or even death may ensue. The mortality figures for this condition in the author's hospital were 11.1 per cent, and the frequency of the disorder is considerably more than is generally believed.

A subperitoneal vascular apoplexy may extend with thrombosis into the adnexa, or rupture may occur into the peritoneal cavity. Partial or total placental separation is usually associated with this apoplectic form. There does not seem to be much relationship, however, between the organic lesion, uterine function and the general condition of the patient. Moreover, the symptoms may not follow the characteristic pattern even when there is complete detachment of the placenta, nor does this accident necessarily produce fetal death in the uterus. It is said that because of the frequency of trauma

shock and the other physiologic changes caused by hemorrhage may occur readily in obstetrics. The treatment of 120 cases reported from 1936 to 1944 is discussed. STEPHEN A. ZIEMAN, M.D.

Eastman, N. J.: Pituitary Extract in Uterine Inertia. Is It Justifiable? *Am. J. Obst.*, 1947, 53: 432.

While procedures employed in the management of uterine inertia are rather well standardized, cases of primary uterine inertia may occasionally prove refractory to treatment. The author discusses the desirability of using a really effectual uterine stimulant such as pituitary extract.

Two hundred and thirty-three ward cases at Johns Hopkins Hospital, Baltimore, are considered, practically all of which were examples of true, often severe, inertia. It is emphasized that uterine inertia and prolonged labor are not synonymous, because prolonged labor may be entirely normal and physiologic, provided that steady, if slow, progress is made. Uterine inertia is present when there is prolonged absence of progress in the presence of weak contractions. As a rule, pituitrin was not given until from 18 to 24 hours of labor had elapsed with weak pains and a stationary cervix, and after all the usual expedients had proved ineffectual. The problem regarding pituitrin was not so much one of using pituitrin versus further temporizing as it was one of using pituitrin versus some radical method of delivery.

It is acknowledged that even if all precautions are exercised, pituitary extract, when given in the first or second stages of labor, will occasionally cause the death of the infant and, less frequently, may result in rupture of the uterus; hence, it is a dangerous drug when given before the birth of the baby. But, since uterine inertia also takes its toll in terms of intrapartum infection, exhaustion, difficult forceps delivery, and Duhrssen's incisions, the author slightly favors the use of pituitary extract, provided that these rigid rules be observed:

1. The case must be one of true uterine inertia, primary in character, with labor practically at a standstill and progress nil.

2. The patient must be truly in labor, not in false or prodromal labor.

3. There must be no mechanical obstruction to easy delivery as attested by every type of evidence, including x-ray study of the pelvis and fetal skull.

4. Patients of great parity, having borne 4 or more children, must not be given pituitary extract because their uteri rupture more readily than those of women in the lower parity brackets.

5. The condition of the fetus must be good, as evidenced by a regular heart beat and absence of meconium stained liquor amnii. A dead fetus is no contraindication to pituitary extract.

6. The obstetrician must observe and time the first contraction after administration of the drug, and give inhalations of ether if it lasts longer than 3 minutes.

7. The initial dose must not exceed ½ minim. This dosage should not be exceeded unless it is clear that no improvement in pains whatsoever ensues. In the latter event it may be increased to 1 minim, but under no circumstances should more than 1 minim be given at a time. A period of 30 minutes must intervene between injections.

8. When there is doubt as to whether a given case meets these criteria, pituitary extract should not be given. JOHN R. WOLFF, M.D.

PUERPERIUM AND ITS COMPLICATIONS

Beecham, C. T.: An Analysis of Deaths from Postpartum Hemorrhage. *Am. J. Obst.*, 1947, 53: 442.

The author, from the Maternal Welfare Committee of the Philadelphia County Medical Society, reviews 520,489 deliveries of live and dead infants in Philadelphia during the 15 years preceding 1945, among which there were 1,987 maternal deaths. One set of mortality figures was constant over these 15 years, those due to postpartum hemorrhage, and averaged 11.2 deaths a year. The Committee has judged 72 per cent of these deaths to be preventable; 62.5 per cent were judged preventable because of errors in judgment or technique on the part of the attending obstetrician and the remainder because of factors pertaining to the patients themselves.

Two-thirds of the patients had various obstetric operations, the vast majority of which the Committee believed were not indicated. Manual dilatation of the cervix and version was uniformly condemned, as there was a very high incidence of stillbirths among the cases so treated.

Study of these 168 case reports of postpartum hemorrhage revealed that many factors had been overlooked and too often hemorrhage was the result of gross carelessness. One of the glaring omissions was good prenatal care, particularly in regard to the nutritional state and study of the blood picture. A third factor in the prophylaxis of hemorrhage is routine typing of all prenatal patients. Prophylaxis against hemorrhage is carried further in labor. The Committee records were incomplete on the sedation used or its judicious application. There was even less evidence of measures employed to combat fatigue and exhaustion. Conclusions regarding anesthesia as a factor contributing toward postpartum hemorrhage were not drawn inasmuch as figures on regional anesthesia were too limited. The author lists several obvious errors in the management of the third stage of labor found by the Committee. As to the etiology of postpartum bleeding, 75 instances of bleeding from an atonic uterus were noted. The cause of the atony in most cases added up to multiple factors ranging from inadequate prenatal care to the choice of anesthetic.

Treatment in the majority of cases was far from ideal. First, there was the failure to utilize oxygen. Second, uterovaginal packing was used in only 26½ per cent of the cases. Third, transfusions were given to only 25 per cent of the patients at a time when it could help. The amounts of blood used were inadequate, since the average was only 500 c.c. The Com-

mittee believes that these measures, more than anything else, are important in combating hemorrhage. It is understood that oxytocics, the Trendelenburg position, and stimulation are in order, but cannot compare with these three major forms of treatment.

JOHN R. WOLFF, M.D.

Molinengo, L.: Carcinoma of the Rectum and the Puerperal State (Carcinoma del retto e stato puerperale). *Ginecologia*, Tor., 1947, 13: 17.

The first case of carcinoma of the rectum during pregnancy was reported in 1843. During the intervening 100 years, only 55 cases have appeared in the literature.

After giving a brief resume of the cases which have been reported during the past 20 years, with the observations made by the various reporters, the author reports a case of carcinoma of the rectum during pregnancy which was treated by him at the Mauriziano Hospital in Turin.

The patient was a 39 year old housewife who had had 3 normal pregnancies and a fourth pregnancy which was interrupted spontaneously one year before her first entry into the hospital on February 2, 1945. At that time she had experienced pain in the anal and perineal regions for 6 months. For 2 months the pain had increased to such an extent that it was almost unbearable. It was accompanied by constipation, painful defecation when the bowels did move, and a mucosanguineous rectal discharge. She had missed 1 menstrual period.

Physical examination showed the patient to be in fairly good general condition. Pelvic examination revealed an enlargement of the uterus to the size of a 2 months' pregnancy. There was a hard tumor, slightly painful on palpation, ill defined, and occupying the median part of the posterior vaginal wall. The overlying mucosa was normal in appearance. Rectal examination revealed the presence of a tumor on the anterior rectal wall, from 4 to 5 cm. in length and about 3 to 4 cm. from the anal orifice. The upper extremity of the tumor was well defined; laterally it extended into the walls of the rectum. The overlying rectal mucosa was fixed to the deeper tissues and in consistency it was hard and rough because of the presence of multiple small irregularities about the size of a small pea. There was a rosy tinted rectal discharge.

The patient entered the hospital on February 2, 1945 with a tentative diagnosis of adenocarcinoma of the rectovaginal septum and pregnancy of 2 months' duration. This diagnosis was confirmed after admission. Although operation was advised the patient refused surgical treatment and was discharged a week later.

A month later, the patient returned to the hospital for the pain had become continuous and was relieved only by morphine. In addition, the patient had experienced nausea, vomiting, anorexia, obstipation, and frequent defecations of bloody rectal discharge. Physical examination revealed pregnancy in the third month, and an increase in size of the rectal tumor, which had extended in all directions. Its surface presented an irregular ulceration from 4 to 5 cm. in diameter. There was a fetid serosanguineous rectal discharge.

On March 12, 1945 the cervix was dilated and the uterus emptied.

On March 28, 1945 the rectum was excised by the sacroperineal route. A triangular area of the posterior vaginal wall was also excised. The vagina and perineum was reconstructed. The amputated end of the intestine was freed and brought down to the sacrococcygeal region where it was fixed.

Microscopic examination of the tumor confirmed the diagnosis of adenocarcinoma of the rectum.

Postoperative convalescence was uneventful and the patient was allowed up on the sixteenth day.

Follow up examination, a year later, revealed the patient to be in good condition both subjectively and objectively. The vagina had cicatrized perfectly and allowed conjugal relations. The sacral anus was functioning satisfactorily.

On account of the rarity of the finding of carcinoma of the rectum during pregnancy, there have been numerous speculations as to the reason for it. The 2 most common explanations are (1) that carcinoma of the rectum is rarer in females than in males, and (2) that it appears most often in the fifth decade of life when fecundity in the female has practically disappeared.

Of the 55 patients with carcinoma of the rectum during pregnancy whose cases were reported, the youngest was a woman of 18 years, while the oldest was a woman of 43 years. According to age, the 55 patients were found to be as follows: 1 was less than 20 years of age, 7 were between 21 and 25 years, 12 between 26 and 30 years, 11 between 31 and 35 years, 10 between 36 and 40 years, and 5 between 41 and 45 years.

Carcinoma of the rectum, in general, occurs most frequently in the fifth decade of life, but carcinoma of the rectum during pregnancy occurs most often before or during the third decade of life.

Pregnancy may be a predisposing factor in the production of carcinoma of the rectum. During pregnancy there is an increased congestion in all of the pelvic organs. Pressure is exerted on the rectum and hemorrhoids occur as a common complication of the pregnant state. Hemorrhoids ulcerate and give rise to bloody discharges. This may lead to more serious changes.

Pregnancy may in some way be the cause of producing cancer of the rectum and cancer in general. Two cases are cited by the author from the literature in which several cancers occurred during pregnancies in the same woman. One woman of 31 years was operated upon for cancer of the rectum following delivery; she was well for 7 years when another pregnancy was interrupted spontaneously at the fifth month. Two months later she developed intestinal obstruction due to a cancer of the ascending colon. Four years later, at the menopause, she was treated for cancer of the bladder.

Another patient, a multipara 32 years of age, with a hereditary neoplastic history, was operated upon for carcinoma of the rectosigmoid flexure after her eighth delivery. She was well for 8 years; then 20 days after a normal delivery of her ninth child, she underwent an operation for cancer of the cecum, which had invaginated into the ascending colon. Two years later, the patient delivered her tenth child prematurely at the eighth month, at which time a stenosing cancer of the artificial anus (made during her second operation), adhering to the posterior vaginal wall, was removed. In these last 2 cases, the pregnancy seemed to have some direct connection with the appearance of the tumors. To avoid recurrence of malignancy during pregnancies, sterilization has been recommended as a prophylactic measure.

Carcinoma of the rectum during pregnancy may be easily overlooked. Whenever untoward signs or symptoms develop, rectal examination should be made for such common signs as bleeding hemorrhoids, discomfort from intrapelvic pressure and constipation as they may be due to the presence of a cancer of the rectum.

If cancer of the rectum is diagnosed as inoperable late in pregnancy, delivery by cesarean section, when the child is viable, is recommended to save the life of the child. Palliative x-ray treatment may then be given to the mother.

If inoperable cancer is discovered early in pregnancy, it is deemed advisable to induce abortion and then administer vigorous therapy by means of roentgen irradiation.

When cancer is deemed operable, radical removal of the cancer of the rectum should be done immediately to benefit the mother, irrespective of the life of the child. Abortion may or may not be done before the radical operation. If the patient undergoes radical operation and the pregnancy goes on to term, then delivery by cesarean section is regarded as being the safest method.

BLACKWELL MARKHAM, M.D.

MISCELLANEOUS

Romero, C. G.: Alterations of Body Weight during Gestation, Parturition, and the Puerperium (Las alteraciones del peso corporal durante la gestación, parto y puerperio). *Rev. españ. obst.*, 1946, 3: 152.

Alterations in the body weight of the pregnant woman were closely studied during a 2 year period at the author's clinic. It was possible to classify the patients into four groups:

1. The normal group in which increase in weight was constant and gradual, ranging between 500 and 1,500 gm., with a sudden transient rise during the seventh month.

2. This group is characterized by a rapid rise during the first 2 months, probably due to endocrine hyperfunction. Adjustment occurs and the weight curve follows according to the normal range during the latter months of pregnancy.

3. This group has an increase in weight along normal lines up to the seventh month. Then there is a sudden exaggerated increase for metabolic reasons with the formation of edema. These changes are considered pathologic.

4. The fourth group may have a diminution or no appreciable weight change during the first 3 months. Then there is an irregular weight increase inasmuch as the gain is under the normal. The cause is considered to be of neurovegetative origin, such as a lack of appetite, vomiting, or hyperemesis, during the early months of pregnancy.

The multiparas show a slightly greater increase in weight than the primiparas. Constitution and stature have some influence as well as twin pregnancy and such chronic processes as heart disease, tuberculosis, diabetes, asthma, nephritis, and lues.

Among the causes enumerated for weight increase are amniotic fluid, size of the uterus and placenta, endocrine imbalance, salt retention, capillary permeability, hypoproteinemia, nephritic and preeclamptic edema, and deranged water metabolism.

STEPHEN A. ZIEMAN, M.D.

GENITOURINARY SURGERY

ADRENAL, KIDNEY, AND URETER

Piero, C.: Suprarenal Apoplexy Associated with Sepsis (Apoplessia surrenale in decorso di sepsi). *Minerva med.*, Tor., 1947, 38: 146.

A 40 year old woman entered the hospital with mild symptoms referable to the right lower quadrant, and died on the sixth day of her hospital course. Autopsy findings included evidence of bronchopneumonia, with generalized sepsis and hemorrhagic phenomena involving the brain and meninges, as well as the serous membranes of the abdomen and thorax, the right ovary, the left kidney, and the suprarenal glands.

The author points out that the course did not conform strictly to descriptions of the Waterhouse-Friderichsen syndrome, but that the finding of gross hemorrhage in the suprarenal glands justified consideration of that classification.

He postulates that the illness began with an episode of bronchopneumonia which developed into generalized sepsis, and that the response to the generalized invasion was essentially a sensitized one manifested by hemorrhages and exudative changes involving the myocardium, spleen, kidneys, leptomeninges, liver, and suprarenal glands. The organism isolated was the Pneumococcus, rather than the meningococcus described in connection with the Waterhouse-Friderichsen, syndrome. However, the pathogenesis conformed so well to that of this syndrome that the hypothesis that bacteria other than the meningococcus could produce this clinical entity seemed justified, provided that opportunity had been given for the sensitization of the skin and suprarenal glands. EDITH B. FARNSWORTH, M.D.

Bacon, S. K.: Hydronephrosis of Supernumerary Kidney. *J. Urol.*, Balt., 1947, 57: 459.

Supernumerary kidney is a rare anomaly which occurs when duplicated or bifurcated excretory ducts extend cranially to enter two independent metanephrogenic masses. They develop into two separate renal entities. The following case of hydronephrosis of a supernumerary kidney is presented:

A woman, age 47, was admitted to the hospital for right lower quadrant pain of many years duration, and right lower quadrant tenderness, without masses. Appendectomy was done after the finding of a "mass of intraperitoneal adhesions." One particularly prominent band was encountered, which might possibly have been a right ureter. One week after operation the right side of the abdomen began to enlarge. On the thirty-first day, examination revealed the presence of a large cystic mass in the entire right side of the abdomen. Cystoscopic studies revealed an enormous right hydronephrosis with normal appearing renal substance above it. With indwelling catheter drainage, the mass disappeared. It was concluded from x-ray studies that a normally formed right kidney existed above the hydronephrosis. At operation, two separate kidneys were found. The craniad organ was normal. The caudal kidney presented a far advanced hydronephrosis which was densely adherent to the peritoneum, colon, and vena cava. The organ was removed and the postoperative course was uneventful save that a ureteral stricture was discovered, which responded to dilatation. ROBERT O. BEADLES, M.D.

Engel, W. J.: Caliectomy for Stone. *J. Urol.*, Balt. 1947, 57: 619.

The good result obtained by partial nephrectomy in a group of 9 patients with caliectasis from stone, 5 years or more after operation, prompts the author to report this series. The operation is indicated in patients with dilated upper or lower calyces containing calculi, in whom it seems apparent that simple removal of the stones would leave behind an abnormal calyx in which urinary stasis would favor the reformation of stone. In all of these cases the operation was deliberately planned following urologic study, a method preferable to decision at the operating table.

The technique is described as employing the usual oblique lumbar incision, spinal anesthesia generally being used. A cobbler type stitch across the pole to be resected controls the bleeding. This stitch is placed as soon as the pole is mobilized and before the capsule is incised (Fig. 1). After it is snugly tied,

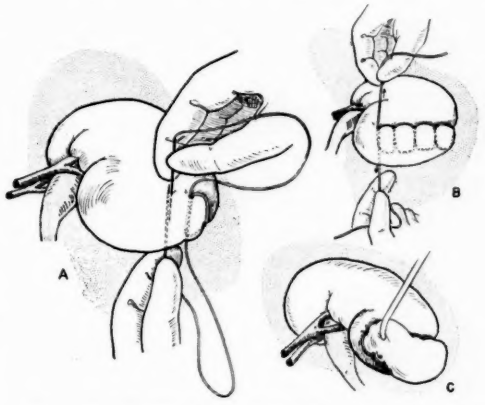


Fig. 1. (Engel). Diagrammatic sketch showing placement of cobbler type of stitch for renal compression. A, First stitch has been placed. Second is being started by inserting needles from opposite surfaces of kidney. Catgut suture, with double end straight, atraumatic needles, is employed. B, As suture progresses across kidney, compression is accomplished by assistant's maintaining traction. C, Shows suture completed and tied on opposite side of kidney.

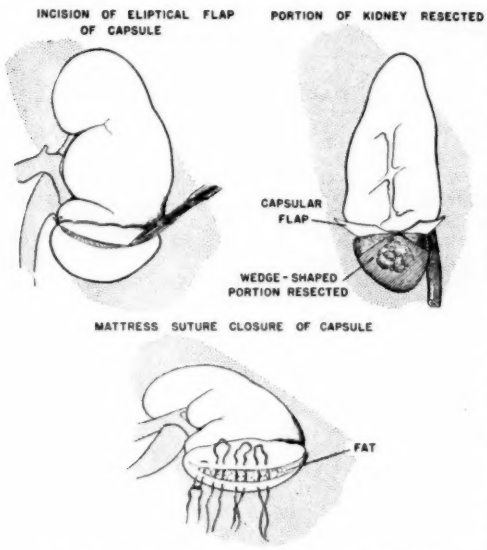


Fig. 2. (Engel). Showing various steps in operation for partial nephrectomy.

an elliptical incision is made in the capsule, distal to the line of suture, and the capsule is stripped back. The pole is then removed by a wedge shaped incision and the capsule is sutured across the cut surface with interrupted mattress sutures (Fig. 2). If there is some bleeding a piece of muscle or fat is sutured against the cut surface, or a thrombin impregnated absorbable sponge may be used. Nephrostomy or pyelostomy drainage was not employed, and there were no postoperative fistulas. In all cases drainage was placed to the operative site.

A review of the series reveals no operative deaths. The average postoperative stay was 13 days, with a minimum of 11 days and a maximum of 15 days. Observation of these patients for from 5 to 12 years following operation reveals no case of recurrent stone. In all of the patients the remaining portion of the kidney is functionally active as measured by diodrast excretion in the intravenous urogram, and in several patients the kidney pelvis appears almost normal. In 8 of the 9 cases there was evidence of urinary infection at the time of operation; however, in all cases the urine was negative at the time of the most recent follow-up examination. Sufficient functioning renal tissue is conserved to sustain life should disease or injury destroy the opposite kidney.

JOSEPH E. MAURER, M.D.

Franzas, F.: Pararenal Abscesses. *Acta. chir. scand.*, 1946, 94: Supp. 116.

Franzas studied 100 cases of pararenal (perinephritic) abscesses, 85 of which were followed up for periods ranging from 2 months to 16 years after discharge from the hospital. Operation was performed on 97 patients. Pararenal suppuration occurred on the right side in two-thirds of the cases, and it affected the rural population 6½ times as often as the urban population.

Cutaneous foci of infection, such as furunculosis, cellulitis, and wounds, caused pararenal infections most often. In 10 per cent of the cases trauma to the lumbar region was the primary cause; physical exertion was also of etiologic importance. Chronic renal disease was of etiologic significance in about 5 per cent of the cases. Abdominal, thoracic, and genital inflammatory processes caused pararenal infection in relatively few cases.

Urinary abnormalities are not of diagnostic import. On the other hand, the roentgenogram is of importance. In 16 of 17 cases examined, motility of the diaphragm was reduced on the affected side. In 21 of 24 instances the delineation of the psoas muscle was absent. In 14 of 21 cases pleuritis was discernible, and in 2 instances an exudate in the pleural cavity was found. Diagnostically, the roentgenologic findings were more important than the pyelogram which elicited hydronephrosis (caused by ureteral compression) in a few cases.

The diagnostic puncture is of value and should be performed in several directions if pus is not obtained on the initial examination. The danger of intestinal perforation is slight.

Treatment by incision alone is insufficient. The abscess cavity should be explored and multilocular retention pockets broken up to promote perfect drainage and to avoid retention of collections of pus. Nonfatal complications occurred in 9 cases. The mortality rate in this series of cases was 19 per cent.

ROBERT TURELL, M.D.

Ellik, M.: Extraction of Ureteral Stones. *J. Urol.*, Balt., 1947, 57: 473.

The instrument. The Balkus modification of the Zeiss looped catheter was used by the author because the materials needed were readily at hand. It was found that 5 F. whistle tipped catheters and Nos. 32 to 35 steel suture wire were the most adaptable. With some personal modifications this apparatus was used throughout the study. These modifications were as follows: (1) the length of the loop was varied between 5 and 7 cm., with an optimum of 6.5 cm.; (2) more lightly radiopaque than the standard x-ray catheters were employed for better contrast with stone shadows; (3) a marker was placed 2 cm. distal to the tip of the closed loop to signal its approach to the bladder; (4) another marker was included on the pull filament to denote closure of the loop; (5) progressive changes in the type and installation of filaments were made because troublesome kinks sometimes occurred in the steel suture wire (the most satisfactory material proved to be dermalon, size 0 or 00); (6) it is planned to flatten and stiffen the loop to improve stone fixation and to insure a wide open noose.

The technique for the successful use of this instrument includes certain refinements. For purposes of organization, it may be divided into 5 parts: (1) preparation of the patient; (2) passage of instrument; (3) formation of loop; (4) engagement of stone; (5) mode of traction.

1. Preparation of the patient. Preliminary cystoscopy and retrograde pyelography are the rule. These procedures are considered manipulative whether the diagnostic catheter passes by the stone or not. Thereafter, spontaneous passage is awaited for 3 to 5 days before extraction is attempted.

2. Passage of instrument. Any cystoscope permitting the passage of 5 F. catheters suffices. Rubber tip connectors with large, loose eyes are important. Cold water for irrigation insures maximum catheter rigidity. The loop must be tested before insertion, and lubrication of the filament within the lumen of the catheter is wise. The most important factor in the passage of the instrument by the stone is patience. After passing by the stone, the catheter is left indwelling for 10 minutes. Before its removal the renal pelvis is filled with air. The impression has been gained that air in the ureter, being moved by peristalsis, loosens and shifts the stone. The instrument is then passed by the calculus through the channel recently vacated by the indwelling catheter.

3. Formation of the loop. The instrument is always passed to the pelvis if possible. Although the loop can be formed in the ureter, this maneuver is much easier in the wide pelvic area. One hand pushes on the catheter as the other pulls on the filament. A marker on the pull filament measures the change but in addition a slight tap is felt as the tip of the catheter hits its sides upon completion of closure.

4. Engagement of the stone. The loop is trolled down the ureter under cystoscopic vision of the ureteral orifice. All pull is confined to the filament to maintain complete closure of the loop. Pull is continued through the cystoscope until the stone is engaged or the tip of the loop appears in the bladder, after which the cystoscope is removed. The tip of the loop eventually catches on the sheath and prevents further traction. Extreme patience and deliberation are essential in drawing the loop down the ureter. Ten seconds per centimeter have been found quite satisfactory before the stone is engaged, and affords sufficient time for the stone to drop into the noose. Engagement produces a certain hang or tug, whereas passage of the loop down a normal ureter is unimpeded. The tip of the loop may hang on the ureteral orifice but a slight twist usually releases it. Roentgen rays are used to confirm engagement.

5. Mode of traction. All traction in this study has been manual. Continuous pull has never been used and contraptions applicable to such have not been employed. Manual traction has been restricted to doctors whether the patient has been on the cystoscopic table or in bed. If the stone resists a 2 pound pull over a reasonable period of time, the apparatus is left indwelling. Many have been left indwelling from a few hours to 6 days. A maximum pull of 3 pounds is exerted 3 or 4 times daily if necessary. Traction is confined to the filament unless a knot has fixed this to the catheter. Between pulls the end of the apparatus is taped to the patient's abdomen. Traction is steady or intermittently deliberate, never jerky. A small spring type scale may be used to determine the weight of pull, when desired. If the stone becomes disengaged it is either relooped immediately or later, as the case might be.

The results obtained were as follows:

Every stone which could be passed by and engaged was extracted, except one, a small stone in the intramural segment which could not be passed by again after disengagement. Transvesical ureterolithotomy proved necessary because of obstruction and infection. This failure may rightfully be blamed on the operator's inexperience, and impatience at the time of traction. Certainly it was not the fault of the instrument. Sixteen stones could not be passed by with any instrument at any time, and 10 of these were removed by operation; the remaining 6 stones were smaller and passed spontaneously after manipulation.

JOHN A. LOEF, M.D.

Young, J. N.: Retrocaval Ureter with Description of an Operative Case Complicated by Ureteric Calculus. *Brit. J. Urol.*, 1947, 19: 22.

The thirty-sixth case of retrocaval ureter is reported, and the embryology and literature of this rare anomaly are briefly discussed. Of the 35 cases previously described 12 were found at operation and 23 at autopsy. There are no symptoms typical of this condition.

The case reported was that of a 24 year old female dwarf who was hospitalized for right renal colic. X-ray examination demonstrated a calculus lying to the right of the lumbar vertebra and small calculi in the left kidney. Intravenous urography showed a right hydronephrosis and the ipsolateral renal pelvis was poorly visualized.

At operation the ureter was found to pass medially behind the vena cava about 2 inches from the ureteropelvic junction. The calculus was found in the ureter as it emerged from behind the vena cava. The calculus was removed.

A plastic procedure was not done to remove the ureter from behind the vena cava since the dilatation of the right kidney was thought to be adequately explained by the presence of the ureteral calculus. The postoperative course was uneventful.

ROBERT LICH, JR., M.D.

Davalos, A.: A New Technique of Ureterointestinal Anastomosis. *J. Urol.*, Balt., 1947, 57: 701.

The technique which is to be described was carried out on 17 dogs, with excellent results in 8 of the 15 dogs thus far sacrificed, fair results in 4, and a poor result in 1 dog; in 2 instances the results were not known. The purpose of this work was to attempt to develop a procedure that would be applicable to

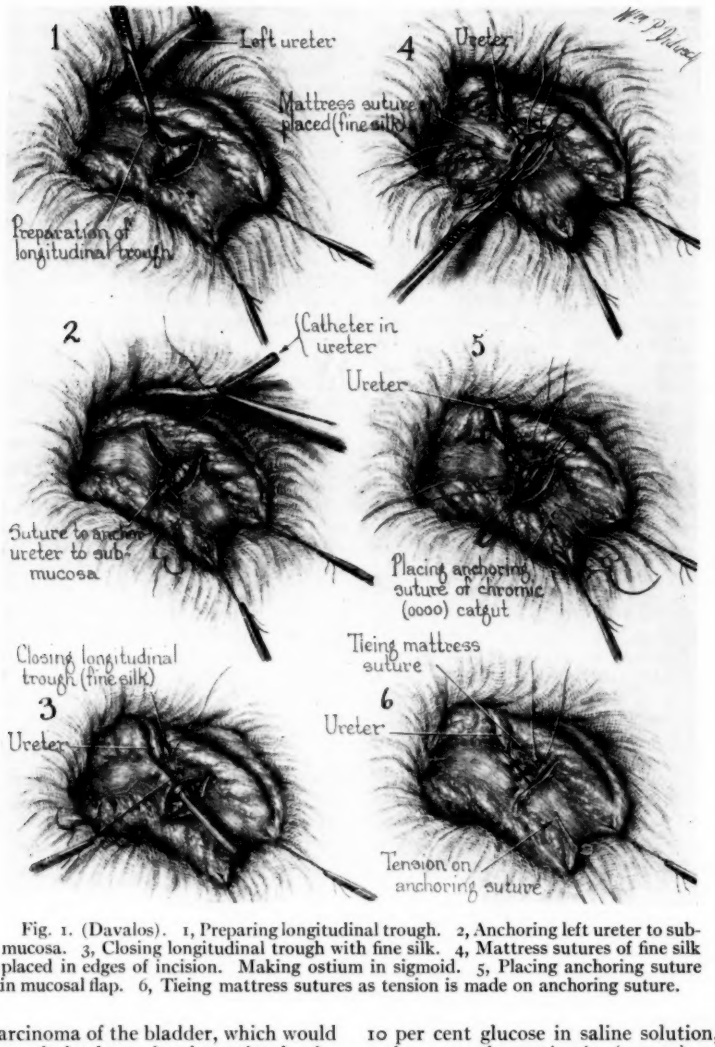


Fig. 1. (Davalos). 1, Preparing longitudinal trough. 2, Anchoring left ureter to submucosa. 3, Closing longitudinal trough with fine silk. 4, Mattress sutures of fine silk placed in edges of incision. Making ostium in sigmoid. 5, Placing anchoring suture in mucosal flap. 6, Tieing mattress sutures as tension is made on anchoring suture.

early cases of carcinoma of the bladder, which would be free of many of the hazards of previously described methods, and which would permit visualization of the uncompressed ureter emptying into the bowel.

The preoperative preparation took 3 days. During the first day a clear fluid diet was given, along with sulfadiazine, and an enema was given that night. On the second day, the preparation was the same except that magnesium sulfate was given in addition; and on the third day water alone was permitted by mouth, the chemotherapy was continued, and the patient was given an infusion of 2,000 c.c. of 10 per cent glucose in saline solution, hard candy, and 1 c.c. of prostigmin (1:2000) every 6 hours. Enemas were given at night until the return was clear, and on the day of operation the parenteral fluids, sulfonamides, and prostigmin were continued.

Continuous spinal anesthesia was used, and the ureters were approached transperitoneally through a transverse suprapubic incision which divided the recti. After the ureters were severed from the bladder a point on the anterior aspect of the rectosigmoid was chosen which was free of mesenteric circulation. A 3½ cm. transverse incision was made in the sigmoid to expose the submucosa. A small inci-

sion was made in the upper border of the wound to form a trough as shown in the illustration, and after the ureter was placed in this trough it was closed with two interrupted fine silk sutures. Mattress sutures of fine silk were then placed in the wound to draw the edges of the transverse incision over the ureter. The mucosa was then incised transversely and an anchoring fine catgut suture was placed in the mucosa to draw the ureter into the bowel. The mattress sutures were then tied and a single additional interrupted suture was placed between the mattress sutures to reinforce the closure. The transplant area was then covered with the posterior reflexion of peritoneum to extraperitonealize the operative area and fix the sigmoid and thus prevent tension. The same procedure was followed in transplanting the opposite ureter. The right ureter was usually transplanted first. The author also illustrates this technique in transplanting a double ureter.

Five cases are reported and, in addition, it is added in a foot note that 10 additional cases have been so treated at the Brady Institute, The Johns Hopkins Hospital in Baltimore, Maryland. In all instances good results were obtained. The 5 patients were all in the sixth or seventh decades with a diagnosis of inoperable vesical carcinoma in 4. One patient had a therapeutically nonresponsive necrotic cystitis. The first patient was operated upon in July, 1945; this patient is still alive and comfortable. Two of the 5 patients operated upon are dead (1 of "anesthesia shock" and the other, 6 months postoperatively, from "a blood stream infection and secondary anemia"); the remaining 3 patients are alive and comfortable.

The author reviews each case briefly and the article is clearly illustrated with drawings of the operative steps and preoperative and postoperative pyelographic studies. ROBERT LICH, JR., M.D.

BLADDER, URETHRA, AND PENIS

Corbus, B. C., and Corbus, B. C. Jr.: Thermal Treatment of Vesical Tumors. *J. Urol.*, Balt., 1947, 57: 730.

The authors present a plea for the more universal application of electrically induced heat in the treatment of bladder cancer. They believe that tissue coagulation, because of additional penetration, is far superior to fulguration.

Tumors from 1 to 1½ cm. in diameter are handled adequately by transurethral methods. When transurethral electrocoagulation with bipolar current is employed, it is necessary to use the largest active electrode passable through an operating cystoscope. If there is any recurrence, a suprapubic cystotomy and electrocoagulation of the tumor, followed by x-ray therapy, should be performed.

All large tumors should be treated transvesically. Use of the flat metal disc as the active electrode produces the maximum amount of available heat. In destroying a tumor involving, or adjacent to, a ureteral ostium, damage to the ostium is avoided by inserting a small silver cannula in the intramural ureter. The cannula, attached to the outside by a black silk suture, is removed in 96 hours. In determining the amount of heat that can be safely applied without destruction of the bladder wall, the tolerance of the gloved finger held in the vagina or rectum is used as a criterion.

Deep x-ray treatment is recommended as a therapeutic adjunct in the treatment of bladder tumors.

CLARENCE V. HODGES, M.D.

Ritter, J. S.: Cystectomy for Carcinoma of the Bladder. *J. Urol.*, Balt., 1947, 57: 719.

The author states that once the diagnosis of infiltrating cancer of the bladder has been made, total cystectomy is the procedure of choice. He favors bilateral cutaneous ureterostomy, rather than ureterointestinal anastomosis, for diversion of the urinary stream.

In 7 cases the perineoabdominal technique of total cystectomy, with implantation of the ureters to the skin, was carried out. The entire procedure was performed at one sitting, in from 1 to 1½ hours. There were no operative deaths.

With the patient in the exaggerated lithotomy position, the usual perineal exposure is made as for perineal prostatectomy. The membranous urethra is divided and ligated. The prostate, seminal vesicles, and bladder neck are then mobilized posteriorly, laterally, and anteriorly as high up as one can reach. After wrapping a large lap pad around the free end of the urethra, the mobilized portions are thrust up into the pelvis. The perineal wound is closed around a small Penrose drain. With the patient in the dorsal position, a transverse suprapubic incision is made about 4 cm. above the symphysis pubis, through the skin and anterior rectus sheath. The recti muscles being separated vertically, the transversalis fascia is separated from the under surface of the symphysis pubis. After separating the bladder and peritoneum laterally down to the origin of the obliterated hypogastric arteries, the separated prostatic extremity is brought upward, and the bladder, prostate, and seminal vesicles are separated posteriorly from the rectum. The mobilization of the bladder is carried out in a retrograde manner. As the ureters are encountered, they are clamped, cut close to the bladder, and intubated. The vessels supplying the bladder are clamped, divided, and ligated as they are encountered. The intimate peritoneal attachment overlying the bladder is clamped, the bladder is cut away, and the peritoneum sutured. The wound is packed with iodoform gauze, the packing being brought out through the wound. The ureter on either side is freed retroperitoneally and brought out to the skin surface through a stab wound, preferably in the posterior axillary line.

The author also suggests that the total cystectomy procedure here described be employed in cases of carcinoma of the prostate gland.

CLARENCE V. HODGES, M.D.

Tashiro, S., and Hinman, F., Jr.: Periurethral and Perirectal Infections. *J. Urol.*, Balt., 1947, 57: 338.

Attempts to interpret the clinical distribution of periurethral phlegmon along the classical fascial planes which limit sterile extravasated urine may delay diagnosis and confuse attempts at rational treatment. Many of these septa break down under the influence of infected urine and pus and allow dissemination of infection with little regard for the classical routes of spread.

Extravasation from the penile urethra may be limited to the penis by Buck's fascia, or may penetrate this layer and spread beneath Colles' fascia, similar to its spread after perforation of the bulbous urethra.

Most commonly the infection begins in the bulbous and bulbomembranous urethra, since this is the most frequent site of stricture and periurethritis. Infection erodes and dissects anteriorly in the space beneath Colles' fascia (since this area is proximal to the origin of Buck's fascia) and over the abdomen beneath Scarpa's fascia. In an occasional case it will spread posteriorly and break through Colles' fascia beneath the superficial transverse perineal muscle and enter the ischiorectal fossa.

If the defect occurs in the membranous urethra, the infection fills the potential space between the superior and inferior layers of the urogenital diaphragm and usually breaks out through the inferior layer to spread anteriorly beneath Colles' fascia. It may ascend through the superior layer and thence into the retroprostatic tissue or into the anterior prolongations of the ischiorectal fossa. Lastly it may break directly through the posterior fascia of the urogenital diaphragm into either ischiorectal fossa.

Perforation of the membranous urethra at its junction with the prostatic urethra, on the pelvic side of the urogenital diaphragm, allows access of the infection to the ischiorectal fossae by way of their anterior prolongations.

Because of the low resistance of the loose areolar tissue of the perirectal area and the weakness of the superficial pelvic fascia compared to Colles' fascia, periurethral infections from any part of the posterior urethra may appear at the surface about the rectum before superficial changes are observed in the urethral area and anterior perineum.

A perirectal abscess usually arises from an infected rectal crypt or mucous gland, enlarges in the ischiorectal or superficial perirectal space, and eventually ruptures spontaneously either into the rectum or through the skin of the posterior perineum. More often than is generally thought, the infection will pass beneath the superficial transverse perineal muscle and localize about the bulbous urethra. It may then spread about the genitalia and over the abdominal wall. The perirectal abscess may also fill the anterior prolongations of the ischiorectal fossa and thereby impinge on the upper end of the membranous urethra as it emerges from the urogenital diaphragm, or it may compress or cause thrombosis of the internal pudendal vessels as they course along the lateral wall of the ischiorectal space. Any of these alternatives may cause urinary difficulty.

In the experience of the authors, periurethral phlegmon and far advanced perirectal abscess frequently have not been differentiated before operation. It is important to differentiate between these diseases preoperatively, because the surgical treatment differs in important respects. In extravasation (septic or sterile) the necessity for immediate cystostomy in addition to radical incision is evident, whereas spreading perirectal infections demand adequate and often extensive incision and drainage but cystostomy may not be indicated. Furthermore, extravasation is usually a urological problem while perirectal abscess is treated either by the proctologist or the general surgeon.

The history of urethral inflammation or strictures is contrasted with the history of cryptitis or hemorrhoids. Dysuria or retention are more likely to indicate periurethral disease, whereas rectal pain and constipation point to involvement of the perirectal tissues. Gross contamination of the urine means major urethral involvement, while mild pyuria may be found in cases of rectal infection with anterior extension. FREDERICK A. LLOYD, M.D.

Lowsley, O. S., and Gentile, A.: Operation for Peyronie's Disease. *J. Urol.*, Balt., 1947, 57: 552.

The operation for Peyronie's disease is done under spinal anesthesia. A tourniquet is placed around the base of the penis, and an incision is made on the dorsal surface of the penis, deepened through the skin, subcutaneous tissue, and fascia, down to the fibrous tissue between the corpora cavernosa. The fibrous tissue and associated plaques are dissected free and removed, care being taken to leave as many venules as possible when Buck's fascia is involved in its mesial portion, as it usually is. A strip of fat is then sutured in place, care being taken not to approximate the edges of Buck's fascia. This precaution is taken because it has been found that the scar resulting from the healing of one side to the other has reproduced the condition to a certain extent. Therefore, the edges are not allowed to come in contact, one with the other. The tourniquet is released, and necessary pressure is re-introduced if bleeding occurs. The subcutaneous tissue is sutured snugly over the fat and the nonapproximated edges of Buck's fascia. This is done with No. 2 plain catgut. The skin is then sutured with silk.

A moderately snug bandage is placed around the penis to create sufficient pressure to ensure hemostasis.

The results are summarized as follows:

"Our experience with operations upon the penis for the cure of Peyronie's disease extends from 1921 down to the present, most of the operations having been done after 1935. Our patients have included men in all decades of life, the youngest being 27 years of age and the oldest 70 years. Our failures have resulted from attempting to operate upon men who

have had too extensive lesions; that is, areas of induration extending beyond the summit of the corpus cavernosum on either or both sides.

"In the early years of our experience with this disease we operated only upon those patients who had tried every form of nonoperative treatment, but now our results justify operating upon any early case." JOHN A. LOEF, M.D.

Schrek, R., and Lenowitz, H.: Etiologic Factors in Carcinoma of the Penis. *Cancer Res.*, 1947, 7: 180.

In the present study, the authors evaluate the significance of venereal disease, circumcision, age, and race as etiological factors in carcinoma of the penis, and illustrate the use of control groups.

The statistical studies, with charts and explanations, are well presented and should be consulted by the interested reader; they do not lend themselves to condensation. A comparison of data assembled from the clinical and control groups suggests that there are two fundamental etiological factors in carcinoma of the penis: (1) circumcision in early life seems to offer almost complete protection against penile cancer and explains the almost complete absence of the condition in Jewish men; (2) poor sex hygiene appears to be responsible for (a) the high incidence of venereal disease in men with carcinoma of the penis, (b) the relatively greater frequency of carcinoma of the penis in colored men, and (c) the high incidence of syphilis in men with a history of gonorrhea.

The authors found that in the groups with carcinoma of the penis, as compared with the control groups, there was a high percentage of negroes, a high incidence of syphilis and gonorrhea, a very low incidence of circumcision early in life, and the same incidence of circumcision during boyhood and early manhood. Positive correlations were obtained for the factors indicated as (1) carcinoma of the penis, (2) syphilis, (3) gonorrhea, and (4) the colored race. The common denominator in these four factors seems to be poor sex hygiene. It may be concluded that the incidence of carcinoma of the penis could be reduced by early circumcision or by good sex hygiene.

ROBERT O. BEADLES, M.D.

GENITAL ORGANS

Dees, J. E.: Congenital Cyst of Prostate. *J. Urol.*, Balt., 1947, 57: 304.

Dees reports a 26 year old male who was seen because of perineal discomfort and difficult urination. He had a history of intermittent attacks of low backache treated by prostatic massage which caused the discomfort to disappear immediately. He had been married for 5 years, but no pregnancies had occurred and several studies of the ejaculated semen failed to show spermatozoa. On examination, the right lateral lobe of the prostate was greatly enlarged, soft, and compressible; it extended slightly across the midline of the prostate and down over the apex of the gland laterally to the pelvic wall and upward for a short distance over the base of the bladder. The lateral margin of the left lateral lobe was normal to palpation. Above and to the left of the cystic mass, between the rectum and the base of the bladder, could be felt several cordlike structures, one of which was presumed to be the left seminal vesicle. The expressed prostatic secretion contained from 20 to 30 leucocytes per high power field. The second glass of urine was microscopically negative. Excretory urograms showed a normal left ureter and kidney and no evidence of excretion of dye by a right kidney. Cystoscopy revealed great enlargement of the right lateral lobe of the prostate which displaced the prostatic urethra well across the midline and obscured the entire right half of the trigone and region of the right ureteral orifice. Subsequent cystoscopy demonstrated absence of the right half of the trigone and its ureteral orifice. The left ureteral orifice and trigone were normal.

At operation the prostate was exposed perineally and the large tense bulging right lateral lobe was incised; a cavity was entered which contained 3 ounces of dark fluid. The cavity extended upward toward the region of the right seminal vesicle. The cyst fluid was compatible with normal seminal fluid, except that the count was 450 million per cubic centimeter, there was an increase in abnormal forms, and no motile spermatozoa were observed. Subsequently 300 c.c. of air were introduced into the bladder, and 20 c.c. of skiodan solution were introduced into the cavity through the previously inserted rubber tube. The cavity was lobulated but smooth walled, and 4 cm. in diameter, and a tubular structure resembling the right ureter was filled up to the pelvic brim; no suggestion of a renal pelvis was seen. A second irregular tortuous tubular structure was filled, which later turned out to be a redundant right vas deferens. Later, the right vas was exposed in the scrotum and injected with skiodan; it communicated with the prostatic cyst. The authors relate as follows:

A large cystic cavity occupied the right lateral lobe of the prostate, but did not communicate with the urethra, and both the rudimentary right ureter and the right vas, which was dilated and tortuous in its terminal portion, opened into this cavity. Distention and enlargement of the right epididymis were also present.

The findings are explained embryologically as a failure of communication between the wolffian duct and the vesicourethral primordium. Although the ureteral bud developed into a rudimentary ureter, its lower end was not absorbed into the developing bladder and urethra, and therefore the ureteral orifice retained its early embryological location in close relationship to the lower end of the wolffian duct.

DAVID ROSENBLOOM, M.D.

Herbut, P. A., and Lubin, E. N.: Cancer Cells in Prostatic Secretions. *J. Urol.*, Balt., 1947, 57: 542.

To corroborate a clinical diagnosis of carcinoma of the prostate, cancer tissue must be demonstrated

microscopically. Conventionally, tissue for histologic study is obtained at biopsy by way of perineal exposure, by transurethral resection, or by removing the entire prostate. In the early stages, however, the former two are not always fool-proof, for the biopsy may not be secured from the right spot, or the urethral portion of the prostate may not contain the carcinoma. In addition to these methods three other procedures of securing material for microscopic study have been advocated: (1) aspiration biopsy of a nodule suspected of being carcinoma, (2) punch biopsy from a similar area, and (3) the demonstration of cancer cells in urine. Each of these is beset with serious difficulties, for both aspiration and punch biopsies preclude the precise localization of the cancer by rectal palpation, and this is open to the objections already cited, whereas the demonstration of cancer cells in urine necessitates exfoliation of neoplastic tissue into the bladder, which is a late feature in this disease.

Secretions are secured by digitally massaging the prostate in the conventional manner. As the drops appear at the meatus they are collected on clean glass slides, and smeared evenly and thinly by covering with another slide and exerting adequate pressure. The 2 slides then are pulled apart and, while still wet, they are immediately fixed in equal parts of 95 per cent alcohol and ether. They should remain in the fixative for at least 15 minutes, after which they are stained by the Papanicolaou technique. Stained smears are examined microscopically, first with 80 magnification and, if irregular cells are found, with 400 magnification in a systematic manner so that all portions of the slide are inspected. If cancer cells are numerous they may be detected in a few seconds, but if they are scanty or absent it takes approximately 30 minutes to examine 6 slides adequately.

In normal, hyperplastic, or early cancerous prostates the quantity of secretion varies from 1 to 2 c.c., but when the organ has been converted into a stony hard mass the quantity diminishes to a drop or two. Normally the secretions are opalescent and pearly white or gray. They are unaltered in carcinoma except when the organ becomes hard; then their quantity is greatly diminished and it becomes thin, watery, and of a poor quality.

Noncancerous secretions. Secretions from entirely normal prostates disclose a paucity of cellular elements. The protein precipitates out in the form of minute light green granules. Scattered here and there one finds a few large flat polyhedral or irregular pavement cells that are doubtlessly derived from the urethral mucosa. Their cytoplasm is abundant, light green, and sharply defined, and the nuclei are small, round, and evenly stained. Prostatic epithelium is sparse. The cells are much smaller than pavement cells. They are single, sometimes in clumps of 2 or 3, polygonal or cuboidal, sharply defined, have a moderate amount of light green cytoplasm, and round or oval central nuclei. Spermatozoa may or may not be present. In nodular hyperplasia the prostatic epithelium is increased in amount. The cells are usually a little larger but are otherwise generally the same. Cuboidal cells are sometimes arranged in rows of as many as one-half dozen, and at other times polygonal cells of equal numbers may be irregularly clustered together. In each instance the cytoplasm is light green, the cells are regular, and their borders are always sharp and distinct. Sometimes, if considerable pressure is exerted in preparing the smears, the cytoplasm may be considerably drawn out, but even in such cells the same characteristics are easily detected. The regularity of the epithelium is perhaps best illustrated in tissue smears of normal and hyperplastic prostates. In addition to single cells there are large sheets of polyhedral cells with sharp, distinct borders, light green to greenish gray cytoplasm and central, regular nuclei. In secretions from hypertrophied prostates there are often numerous large foam cells with reticulated or vacuolated cytoplasm and round eccentric nuclei. Concretions, debris, neutrophiles, plasma cells, lymphocytes, and erythrocytes are also present in varied proportions. The same elements are present in secretions from patients with prostatitis with the exception that both neutrophiles and fibrin dominate the picture.

Cancerous secretions. Because carcinoma of the prostate is associated with a normal, hypertrophied, or chronically inflamed prostate, the cells in the secretions vary accordingly. In addition to the usual cellular elements, however, some cancerous prostates reveal numerous large flat pavement cells that stain all colors of the rainbow. As already noted, these cells are very few in number in noncancerous prostates where they generally stain a light green color. Aside from pavement cells, all cases of carcinoma but 2 in this series, in which the secretions were inadequate for examination, also disclosed cancer cells. As might be expected, the latter vary considerably from case to case, depending upon the histologic structure of the carcinoma, but the variations are, nevertheless, constant enough to enable one to anticipate the type of cancer. In well differentiated adenocarcinoma, smears of secretions usually disclose large or small, solid sheets of cancer cells with irregular, flat or rounded, well defined or sharply delineated margins. The cell boundaries are always indistinct or entirely imperceptible and the cytoplasm tends to become confluent. It is scanty, light gray, grayish green, or reddish orange. The nuclei are relatively large, oval or round, deeply but evenly stained, and may or may not contain nucleoli. Scattered throughout the smears are a few essentially similar single cells with moderate or scanty, always ill-defined and peripherally frayed, cytoplasm. In carcinomas which partly or completely fill the acini with large, somewhat irregular cells the secretions reveal clusters of cancer cells that are not as solid or as dense as those in the former group. The collections are spread thinner and are often drawn out into long pointed projections. The cells vary in size but as a rule they are larger than those in the more differentiated tumors. The cytoplasm is abundant although relatively decreased, stains lightly, and

is of a blue green or yellowish green color. The nuclei are large, round, sharply defined, and are rimmed with a distinct membrane. They disclose watery, almost vacuolated, lightly stained nucleoplasm and a sharply circumscribed, deep blue to black, centrally placed nucleolus. Single tumor cells scattered throughout the smears are essentially similar. Cancer cells in secretions from completely undifferentiated carcinomas likewise vary somewhat from patient to patient. Characteristically, however, they are found singly; if in clusters, they are only loosely adherent to each other. The cells are comparatively small, have a moderate or scanty amount of ill-defined, peripherally frayed, yellowish gray or green cytoplasm and relatively large, round or oval, evenly but deeply stained nuclei. In cancers composed of large round, oval or polygonal cells with reticulated or vacuolated cytoplasm, the secretions usually reveal clusters of cells with scalloped margins. The cell boundaries, in contrast to those from other types of carcinoma, are quite distinct. The cytoplasm is reticulated or actually vacuolated, and the nuclei are round or oval and centrally or eccentrically placed. Apart from the aforementioned clear-cut types, carcinoma of the prostate frequently shows combinations of the various patterns which are reflected almost as clearly in smears of the secretions as they are in histologic sections.

In conclusion, the authors state that a cytologic diagnosis of carcinoma of the prostate from smears was rendered 17 times. The diagnosis was confirmed histologically in 10 cases and was reasonably certain clinically in an additional 6 cases. Some of the patients will be operated upon in the near future. The seventeenth patient has no obstructive symptoms; the prostate was normal on palpation, and the patient is being followed closely for further developments. A diagnosis of carcinoma from an examination of smears was not rendered in 1 case histologically proved, and in 1 clinically evident case of cancer. In each of these the secretions were scanty and of a poor quality. JOHN A. LOEF, M.D.

Bisquertt, J. E., and Emmett, J. L.: Transurethral Resection for Postoperative Urinary Retention. *J. Urol.*, Balt., 1947, 57: 771.

When one is confronted with the usual case of urinary retention following surgical removal of the rectum and sigmoid, it goes without saying that every means should be tried to establish normal micturition before transurethral resection is advised. When 3 or 4 weeks have elapsed after operation and the patient is still unable to void satisfactorily and a large residue remains, the problem demands more serious consideration. The surgeon must then decide whether to continue with indwelling or intermittent catheterization for several weeks or months, hoping that vesical function will eventually be reestablished, or whether to relieve the patient quickly of his trouble by transurethral resection. Because transurethral resection in these cases involves little or no risk to the patient, causes no discomfort, and will eliminate the vesical dysfunction and residual urine promptly in well over 90 per cent of the cases, it is the authors' opinion that, when indicated, it should not be postponed longer than 4 weeks after operation unless the patient's general condition is not satisfactory. It is not necessary to perform a preliminary cystoscopic examination on the patient to decide if resection is indicated. Whether the condition is a simple contracture or fixation of the vesical neck or adenomatous hyperplasia, transurethral resection, if completely done, will eliminate the residual urine and establish normal micturition.

In the original paper on this subject, by Emmett and Cristol, 33 cases were presented in which transurethral resection had been performed after operations on the rectum and sigmoid. These cases were encountered at the clinic in approximately a 10 year period which ended with January, 1944.

The authors thought that it would be instructive to study this subject again by analyzing the cases in which transurethral resection had been done since the original report. Among other things, they were interested in determining the approximate incidence of patients who came to transurethral resection following surgical removal of the rectosigmoid. Accordingly, they reviewed the 24 cases in which the operation was performed during the 2 year period from January 1, 1944 to January 1, 1946, inclusive. These constitute approximately 3 per cent of the cases in which the rectum, sigmoid, or both, were removed at the clinic during this period.

The largest number of operations performed on the rectum and sigmoid were one-stage combined abdominoperineal resections. None of the patients was less than 50 years of age; most of them were more than 60 years of age. At least 4 weeks were allowed to elapse in most cases. This was done for two reasons: first, to allow the patient a sufficient time for recovery between the two operative procedures, and, second, to give the bladder a chance to re-establish its normal function spontaneously. The amount of tissue to be removed in most cases is rather small (15 gm. or less). The results of the transurethral resection in these cases are classified as follows: excellent, 20; fair, 2; and poor, 2. Contrary to general opinion, good results in transurethral resection are not secured most easily in cases in which the patients have small prostates (weighing less than 10 gm.), but rather they are obtained when the prostates are of moderate size (weighing from 40 to 60 gm.).

Valério, A.: The Surgical Treatment of Hydrocele (Tratamento cirúrgico de certos hidrocéles vaginais). *Brasil med.*, 1947, 61: 55.

In 1,468 cases of hydrocele of the testis or the spermatic cord, the author employed injections of sclerosing substances. Under local anesthesia the contents of the hydrocele were aspirated and from 2 to 5 c.c. of Lugol's solution, 90 per cent alcohol, iodine solution, phenol, ether and iodoform, corrosive mercury of bichloride solution, formalin, quinine

and urea solution, or similar substances were injected. After from 5 to 10 minutes the liquid was withdrawn and a scrotal support was applied. In this manner cures were obtained in 92 per cent of the cases. In 6 per cent a second injection was required.

A complete excision of the tunica vaginalis is impossible because the structure is adherent to the testis and epididymis, and forms 3 pouches or recesses, the internal (on the median side of the testis), the median (between the testis and the epididymis), and the external (over the upper border of the testis).

The author highly recommends Pauchet's method, which consists essentially of creating a new location for the testis within the scrotum. This was employed in 56 cases with excellent results. An incision in the inguinal region is preferable to one in the scrotum because it is less subject to infection. The hydrocele sac is incised, its contents are allowed to escape, and a new lodge is formed for the testis with a tissue forceps. The sac is everted, or inverted, and the skin is sutured after a partial resection.

JOSEPH K. NARAT, M.D.

Lazarus, J. A., and Marks, M. S.: Anomalies with Undescended Testis. *J. Urol.*, Balt., 1947, 57: 567.

The authors review the literature on the embryology and anomalies of the testis and epididymis, and report the following case of complete separation of a partly descended epididymis and vas deferens, and an abdominal testis:

R. L., a well developed (6 foot) boy, 14.5 years of age, consulted the authors on October 9, 1945 for a left undescended testicle. The phallus was normal. The right testis showed no abnormality. The left half of the scrotum was completely undeveloped. Situated outside and above the external inguinal ring, a soft nontender nodule the size of a large lima bean could be felt. This was assumed to be an atrophic testicle. The external ring was not dilated, and no impulse could be detected on coughing.

The operative findings were as follows: situated over the aponeurosis of the external oblique muscle caudad to the external inguinal ring there was a structure about the size of a large lima bean, soft in consistency and adherent to the aponeurosis by rather dense adhesions. The vas deferens, which was attached to the upper pole of this body, entered the external inguinal ring and ran upward in the inguinal canal. Careful exploration of the inguinal canal disclosed a structure approximately the size of a large hazelnut lying within the internal inguinal ring, and covered by a transparent tunic. Upon opening the latter, the structure proved to be a testicle completely devoid of epididymis and vas, with a long gubernaculum, and a hilus with all the structures of the spermatic cord except the vas deferens. There was absolutely no connection between the testicle and its vas deferens.

The funiculus was opened and, by sharp dissection, separated from the tunica vaginalis of the testicle. The neck of the sac was transfixed with a chromic suture ligature. All adhesions around the cord were carefully divided, thus readily enabling the testicle to be brought down into the atrophic left scrotal sac, previously prepared by finger dissection to receive it. The testicle was then anchored in the newly formed scrotal sac by a mattress suture of heavy silk passed through the gubernaculum at its attachment to the testis, and then to the skin of the inner aspect of the left thigh. The vas deferens and isolated epididymis were removed by dividing the vas high in the inguinal canal between two chromic ligatures. The operation was concluded in the usual Andrews-Bassini fashion, with transplantation of the cord.

JOHN A. LOEF, M.D.

MISCELLANEOUS

Hamm, F. C.: Amicrobic Pyuria. *J. Urol.*, Balt., 1947, 57: 226.

Cases of amicrobic pyuria constitute a small but important group of urinary infections, differing from the ordinary type of pyogenic infections in that no organisms can be demonstrated, either by culture or by a gram stain of the urinary sediment, and they do not respond readily to any of the known forms of therapy. The author reports on 7 cases in which urinary tract tuberculosis was carefully ruled out.

The symptoms are severe, being dysuria, frequency, suprapubic pain, and terminal hematuria. Fever is uncommon. Leucocytosis is mild. The acute period of this condition may last several weeks, confining the patient to bed. Physical examination is negative. The cystoscopic picture is that of severe diffuse cystitis with markedly contracted bladder. One of the constant findings is a generalized dilatation of the upper urinary tract, but in none of the author's cases was pus present in the kidney urine in great degree.

Treatment with sulfathiazole, sulfadiazene, and penicillin proved of no value. Mapharsen, given every 5 days for 5 doses, was followed in every instance by improvement, but cure could not be attributed to this agent alone. Three cases received streptomycin, and the results obtained were described as satisfactory.

This condition, which is essentially resistant to all forms of therapy, appears to be self limited to a certain degree. The lack of prompt response to treatment and the absence of marked systemic reaction to such severe infection suggest the possibility of a virus infection.

JOSEPH E. MAURER, M.D.

Baines, G. H.: Abacterial Pyuria from a New Angle. *Brit. J. Urol.*, 1947, 19: 6.

Abacterial pyuria is discussed by the author from the standpoint in that this condition is spread by sexual contact. A total of 15 cases are reported, and of this group 12 were collected in a general service hospital during a 4 months period.

The author describes the cystoscopic diagnosis during the acute, subacute, and healing phases.

During the acute stage there is considerable edema of the mucous membrane of the bladder with a great tendency toward bleeding so the cystoscopic study is both difficult and ill advised. It is ill advised since the possibility of inducing an epididymitis is great. The characteristic picture in this stage is edema, and in 2 instances the patients were referred to the author because it was thought that they had bladder tumors.

In the subacute phase the characteristic lesion is an edematous plaque of plum colored mucosa. In the central portion of this area a slough develops and a small ulcer results. The trigone seldom seems to be involved in this stage, but the ureteral orifices are usually involved and this accounts for the not infrequent spread to the kidneys with their characteristic subepithelial round cell infiltration.

The healing stage occurs by the resolution of the edematous areas and healing of the ulcers so that the bladder shows areas of inflammation or appears, in the words of the author, "as though it had been splashed with small drops of red paint."

The use of novarsenobillon is specific for this condition and the healing process under this therapy occupies less than a fortnight. There is apparently no residual scarring, and almost immediately after the institution of this therapy the bladder becomes insensitive and the reduced vesical capacity rapidly increases.

The subjective signs of this condition are those of vesical irritation and reduced bladder capacity with pyuria and hematuria. The vesical pain is out of proportion to the degree of frequency. Fever, increased pulse, and toxemia are notable by their absence.

In all the cases reported there had been a history of recent sexual contact and, with the exception of 3, all had had a urethral discharge. The discharge was often only of a few hours' duration and was thin and watery in character.

Nine cases of nonspecific epididymitis were reported and of this group 4 were treated with novarsenobillon with immediate relief. The swelling subsided with great facility. ROBERT LICH, JR., M.D.

Goldstein, A. E., and Rubin, S. W.: Reiter's Disease followed by True Infective Abacterial Pyuria. *Brit. J. Urol.*, 1947, 19: 32.

The author reports a case of simultaneous Reiter's disease and infective abacterial pyuria.

There has been no etiological agent established for Reiter's disease with its triad of urethritis, arthritis, and conjunctivitis. Nor has the etiological agent responsible for abacterial pyuria been determined, although it has been shown repeatedly that the arsenicals are therapeutically specific.

The case presented was that of a 25 year old male who had a urethral discharge 8 days after sexual exposure, which was found not to be due to the gonococcus. Sulfonamides did not afford any relief and 3 weeks after the onset of the urethral discharge an incapacitating swelling of the right knee and ankle was noted. A week later a purulent conjunctivitis developed. The latter cleared with penicillin and sulfonamide medication, but the arthritic and urethral symptoms remained.

After 5 months the symptoms began to subside and at this time the patient came under the care of the author. At this time the patient claimed marked urgency, frequency, nocturia, dysuria, and hematuria. The physical examination demonstrated little except for tenderness and swelling of the right knee and just above the right ankle.

The urine examination was essentially normal except for pus, blood, and the presence of staphylococci on direct smear. Intravenous pyelography was without significant findings although both ureters were slightly dilated. Cystoscopy showed a markedly injected mucous membrane of the bladder, particularly in the right and left anterolateral portions along with ureteral orifice dilatation. The kidney urines as obtained by ureteral catheters were found to be free of blood and pus.

The administration of 40 mgm. of mapharsen resulted in immediate symptomatic improvement, and 2 additional injections were given at weekly intervals. The patient was asymptomatic during the 6 months prior to publication of the original article.

The author briefly discusses the treatment of Reiter's disease and abacterial pyuria and reviews its etiological possibilities. ROBERT LICH, JR., M.D.

Adcock, J. D., and Plumb, R. T.: Urinary Tract Infections. *J. Am. M. Ass.*, 1947, 133: 579.

Streptomycin has been shown to be effective in vitro against various gram negative bacilli frequently responsible for urinary infections which prove refractory to sulfonamide compounds and penicillin. The purposes of this article are (1) to report the results of streptomycin therapy in 11 patients with infections of the urinary tract due to gram negative bacilli which were sensitive to streptomycin in vitro, (2) to correlate results of in vitro sensitivity and the concentrations of streptomycin in the patients' serum, and (3) to report the acquisition, in vivo, of definite resistance to streptomycin.

The results of streptomycin therapy were most impressive in 5 patients with chronic infections due to organisms of the Aerobacter group. There was prompt relief of symptoms, pyuria disappeared, and urine cultures became sterile. These effects persisted after streptomycin therapy was discontinued.

The 5 cases in which the Pseudomonas aeruginosa was present, alone or in combination with other organisms, responded less satisfactorily. In each case pyuria diminished or disappeared and the temperature rapidly declined in the cases with acute episodes. The Pseudomonas aeruginosa was, however, constantly present in urine cultures following therapy.

In a case of chronic cystitis due to Escherichia coli, temporary relief of symptoms and diminution of pyuria occurred but the bacilluria persisted.

In most instances a bactericidal effect was obtained when the concentration of streptomycin in the serum

was approximately 10 or more times as great as that required for inhibition of the infecting organism in vitro. However, the effect appeared to be merely bacteriostatic against the more resistant organisms in cases in which the sensitivity of the infecting organism more nearly approached the concentrations attained in the serum. The demonstration that the concentration of streptomycin in various tissues is far below that found in the serum may help to explain these relationships. Although streptomycin appears in the urine in high concentration it is doubtful that this is of importance in therapy, since in an established infection there must certainly be invasion of tissue as well as infection of the urine itself.

Among the bacteria isolated following therapy, three organisms apparently acquired an increased tolerance to streptomycin. In 1 case a strain of the Pseudomonas aeruginosa recovered just prior to therapy was inhibited in vitro by 4 mu. gm. of streptomycin, while the strain isolated after 4 days of treatment required 200 mu. gm. for inhibition. In the same patient a strain of the Streptococcus faecalis which was initially present was inhibited by 20 mu. gm., but after 4 days of treatment it grew well in 1 mgm. Similarly a strain of the Escherichia coli was sensitive to 1 mu. gm. and after 5 days of treatment it grew in 1 mgm.

Should this phenomenon prove of frequent occurrence the size of the initial dose of streptomycin will be of extreme importance, and if a bactericidal effect is to be obtained it must be obtained promptly.

FREDERICK A. LLOYD, M.D

Pool, T. L., and Cook, E. N.: Urinary Tract Infections. *J. Am. M. Ass.*, 1947, 133: 584.

Two important factors must be considered in the management of infections of the urinary tract. The first is the coexistence of other pathologic processes in the urinary tract.

It was observed early that the presence of obstruction, tumor, stone, or marked chronic inflammatory changes in the urinary tract definitely reduced the efficacy of the ketogenic diet in the eradication of urinary infection, but when none of these pathologic processes were present the results of treatment with the ketogenic diet were much better. Exactly the same observations were made when mandelic acid, the sulfonamides, penicillin, and streptomycin were used. The other factor is the variation in the results obtained with the various strains of organisms. This definitely suggests the importance of using various therapeutic compounds in alternate courses if one or another fails to eradicate the infection. Of course there is no use to do this if coexisting pathologic conditions have not been removed first of all.

For the routine treatment of infections of the urinary tract, mandelic acid and the sulfonamides are still the drugs of choice. Penicillin is a great adjunct to treatment but it has not been the boon we had hoped for in the ordinary case of nonspecific infection of the urinary tract. Streptomycin produces spectacular results in some cases of resistant urinary infection, but cannot be used routinely at the present time. Our studies concerning this drug are incomplete because the supply has been so limited that it has been impossible to carry out the investigative work that should go along with the study of any antiseptic.

Donovan, H.: Care of the Urinary Tract in Paraplegic Patients. *Lancet*, Lond., 1947, 1: 515.

Donovan treated 82 paraplegic soldiers in a regional spinal unit. . Almost all of them had had a high suprapubic cystostomy. The tubes were changed weekly. A No. 28 Malecot type connected to a leg bag is preferred. Tidal drainage was employed enthusiastically at first, but the author concluded that the urines were more cloudy, and pyrexial attacks were commoner with all methods of bladder drainage other than the direct simple one of leading the suprapubic tube into a bedside bottle.

After trying many solutions, the author settled upon 1:5000 neutral proflavine solution as an irrigating medium. The bacterial flora were constant, consisting of the Bacillus coli, Streptococcus faecalis, Bacillus proteus, and Pseudomonas pyocyanea. It was found that penicillin was the best drug for ending a pyrexial attack. Ammonium chloride (60 gr. daily) was the best routine urinary antiseptic, and the *p*H of the urine was kept at 5. Pyelography was carried out to exclude an obstructed upper urinary tract for unexplained fever lasting 3 days or more. During these attacks the urine from the bladder was almost always infected although it might have been clear to the naked eye.

A patient with an intact micturition center in the cord can often develop satisfactory automatic micturition with sufficient warning to enable him to dispense with an incontinence apparatus. When the bladder is closed, the urine usually becomes much cleaner, and the flora become simplified. Once the bladder has been satisfactorily closed, pyrexial attacks may cease, and the patient's morale is greatly improved. However, if he is completely bedridden, as with a low cervical lesion, nursing is easier with a suprapubic tube. In deciding whether the patient can achieve automatic micturition, the author looks for the following signs: (1) Does urine pass during bladder lavage or obstruction of the suprapubic tube? (2) Does the patient pass urine and empty the bladder during cystometrogram studies at any reasonably low pressure? (3) Do the muscles of the legs respond to faradism?

About one-third of the patients developed calculi. In every case the renal tract was always roentgenographed every 2 months, and an intake-output chart was kept. The patient's position was frequently changed, a high acid-ash diet was employed, and the urine was kept at a pH of 5 with ammonium chloride. In 20 per cent of the patients, renal or ureteral calculi were found. There was no apparent connection between the stone formation and the level of the paralysis. Recumbency was probably a major factor in causing stones, and urinary tract infection

was an important accessory cause. Stones were observed to form rapidly, in a matter of weeks.

Cystometrograms were made but were not of great practical value as they did not show the site of the lesion or the degree of functional recovery. Excretory urograms demonstrated that no dilatation took place as long as the bladder was drained, although dilatation of the upper tract is much more likely with cauda equina lesions than with spinal cord lesions. In the former, the ureter can dilate extremely even after a few hours of retention.

DAVID ROSENBLOOM, M.D.

Roth, A. A.: Familial Eunuchoidism. *J. Urol.*, Balt., 1947, 57: 427.

The author studied 4 brothers who presented a marked hypogenitalism on examination by the following tests: biopsy of the testes and mammary glands; x-rays of the skull, frontal sinuses, and chest; excretory urograms; assays of urinary gonadotropins and 17-ketosteroids; determinations of the blood cholesterol, blood urea nitrogen, glucose tolerance, calcium, and phosphorus; urinalysis, blood counts, study of the basal metabolism rates, and the blood pressure and Kline tests. Ophthalmological checks and psychometric studies were also carried out on each patient.

The first patient was 55 years old. The outstanding findings in his case were infantile sex organs, retinal degeneration with rotatory nystagmus, unsteady gait with wide base, and marked arthropathy of the left knee. The testes were small and microscopic studies showed the tubules to be small and papulated with Sertoli cells.. Some tubules contained spermatogonia. Sclerosis and hyalinization ranged from moderate to severe in the tubules. The fibroblasts were increased. No Leydig cells were seen.

The second patient was 52 years old. He presented marked infantile sexual structures, retinal degeneration, rotatory nystagmus, scanning speech, and eunuchoidal proportions. Testis biopsy was similar to that of case 1. There were also hypoactive reflexes, adiadokocinesis of the right arm, and asynergy major.

The third patient was 49 years old and presented marked infantile sexual organs, extreme obesity, retinal degeneration with rotatory nystagmus, large breasts, generalized hypotonia, asynergy major, and adiadokocinesis of both arms. Testicular biopsy was similar to that of case 1. There were no germinal cells present, many tubules were completely hyalinized, and no Leydig cells were seen.

The fourth patient was 47 years old and presented eunuchoidal proportions, sexual infantilism, gait disturbance, and visual difficulties due to retinal pigmentation and rotatory nystagmus. Testicular biopsy was similar to that in case 1.

The appearance of the testes suggested that spermatogenesis had never occurred and this was interpreted as being due to a long standing lack of pituitary gonadotropins. The atrophic appearance could be secondary to failure of development from an infantile state.

The 17-ketosteroids in all 4 individuals were markedly diminished, as were the urinary gonadotropins.

Cases 3 and 4 were treated for 40 days with chorionic gonadotropin and pituitary gonadropin with no results and it was concluded that the testes were incapable of responding to such stimulation. All cases were treated with testosterone, which resulted in increased pubic hair, voice change, increase in the size of the sexual organs, and improvement in the gait and muscle tone.

The author concludes that long standing degeneration of the anterior pituitary gonadotropic hormones can produce gonadal failure and the resulting adipose genital dystrophy observed in these cases. In addition, there is probably partial adrenocortical failure secondary to lack of adrenotropin. The article includes remarks concerning the hereditary aspects of this so-called syndrome.

ROBERT O. BEADLES, M.D.

SURGERY OF THE BONES, JOINTS, MUSCLES, TENDONS

CONDITIONS OF THE BONES, JOINTS, MUSCLES, TENDONS, ETC.

Alarcón, F. O.: Penicillin and Osteomyelitis (Penicilina y ósteomielitis). *Rev. As. méd. argent.*, 1947, 61: 5.

The author believes that osteomyelitis and osteitis develop from inoculation via the blood stream, from an exogenous source, or from a small contiguous infectious focus. He believes that penicillin has definitely lowered the mortality rate and the number of complications, but reserves his opinion regarding a total cure and the possibility of sterilizing a focus.

The doses should be large parentally and locally. If there is no tendency toward resorption of the sequestra, resort to surgery is indicated. Abscesses should be drained.

Osteomyelitis is never cured if there is an elevated blood count, and in chronic osteomyelitis, penicillin therapy should accompany the Orr treatment. Surgery should not be omitted when penicillin is used; rather the latter is an auxiliary to surgery, particularly when a compound fracture is present.

STEPHEN A. ZIEMAN, M.D.

Cosacesco, A.: Von Recklinghausen's Generalized Osteitis Fibrosa Cystica and Epithelioma of the Breast. Difficulties of Diagnosis (Ostéose fibro-géodique généralisée de Recklinghausen et épithélioma du sein). *Rev. orthop.*, Par., 1946, 32: 359.

Von Recklinghausen's disease treated and cured by parathyroidectomy is still sufficiently rare to warrant the presentation of a case of parathyroid osteitis associated with cancer of the breast.

A 38 year old female was admitted to the hospital with pathological fractures of both femurs and paralysis of the lower extremities associated with severe pain. The patient had pain first in the right leg, then in both legs and the right shoulder for the last 12 years. She consulted many physicians who treated her for rheumatism. Five years later she was forced to use a cane when walking. At that time a positive blood Wassermann reaction was discovered and for the following 2 years she received antisyphilitic treatment without effect on the "pain in her bones." Ten years after the onset the patient was bedridden. She had to be hospitalized for 15 days because of a "hepatic crisis." About a year later she sustained a fracture of both femurs associated with little pain. Six months later she sustained another spontaneous fracture of the right femur and soon afterward a fracture of the right clavicle. At this time there was complete lack of control of the lower extremities, generalized amyotrophy, and pronounced myasthenia; there were also old ununited fractures and recent fractures which were not accompanied by any discomfort. Roentgenological examination showed generalized decalcification especially of the pelvis, spine, femora, and clavicle. There was some periosteal reaction in areas where the cortex seemed to have disappeared. There were cavities observed in the shafts and epiphyses of the long bones which gave the bones a polycystic appearance. The fracture fragments were overriding and there was no trace of repair.

There was slight hypotension, slight anemia, and a positive blood Wassermann reaction. The blood calcium ranged from 1020/00 to 1200/00 (Waard method), and the phosphatase was elevated to 960/00 (Jenner Kay method). The urine calcium was somewhat above normal, 0.46 per cent, and the phosphorus, 1.73 per cent. The Bence-Jones albumin was negative.

There was hypertrophy of the thyroid, this organ being the size of half a lemon. Exploration of this area revealed a true enlargement of the gland. The hypertrophy of the thyroid gland dated back to the onset of the patient's skeletal complaints. The right breast showed a small scar, the result of a biopsy about 6 months prior to the patient's admission to the hospital. The biopsy revealed an epithelioma. The regional lymph glands were not involved. The patient refused mastectomy at that time.

A diagnosis of generalized osteitis fibrosa cystica (von Recklinghausen) was made but the possibility of bony metastases from the epithelioma of the breast could not be ruled out definitely. It was therefore decided to perform a thyroidectomy. Histological examination of the excised right lobe showed masses of parathyroid cells imbedded in the thyroid tissue.

Twenty-one months after the operation the general condition of the patient was greatly improved. There was gain in weight and the "bone pains" and asthenia completely disappeared. The pathological fractures were solidly healed but misaligned because of the fact that the patient removed the plaster casts after a month and a half. The X-ray examination showed considerable bone changes. The contour of the bones as well as their density was nearly normal. There was still some evidence of cysts in the shafts but the cysts were much less distinctly outlined. There was no change in the blood chemistry. The Chvostec sign was slightly positive, the Trousseau sign negative. There was regional glandular involvement of the breast cancer. Mastectomy was now performed.

GEORGE I. REISS, M.D.

Fossati, F.: Roentgenological Considerations of a Rare Osteoarthropathic Syndrome (Considerazioni radiologiche su di una rara sindrome osteoartropatica). *Radiol. med.*, Milano, 1947, 33: 1.

The author reports a case of a female 47 years of age in whom symptoms of pain in the lower extremities started at the age of 11 and gradually became more manifest at the age of 16, when motion be-

came limited. This pain was accentuated at the beginning of menstruation, but was never accompanied by fever. At first the pain was more or less localized in the knee; then it spread to the shoulder, elbow, wrist, and feet in the given order. Within a year's time, at the age of 21, the patient experienced an ankylosis of all her joints and was not able to assume the erect posture, eventually becoming bedridden. Pain at the beginning was great, but it gradually diminished and finally disappeared, while the ankylosis increased and spread to the feet, legs, and vertebral column.

The roentgenograms were characterized by numerous ankylosing foci of alterations of various sizes; these were symmetrical osteolytic processes in the epiphyses and diaphyses. There was concentric atrophy in the region of the diaphyses and ankylosis of the large and small articulations.

This condition must be differentiated from primary ankylosing chronic polyarthritis, neurogenic osteopathies, myelodysplasic trophopathy of the foot (described by Kienboeck), localized cryptogenic osteolysis, scleroderma, Raynaud's disease, the acromicria of Brugsch, and Blum's osteoarthropathic microatroficans.

ARTHUR F. CIPOLLA, M.D.

Umansky, A. L., Schlesinger, P. T., and Greenberg, B. B.: Tuberculous Dactylitis in the Adult. *Arch. Surg.*, 1947, 54: 67.

Tuberculous dactylitis in the adult is a rare disease. It is relatively common in children. The disease involves the phalangeal bones of the hands. Because of its bony deformity it is called spina ventosa.

The authors' case report of a 19 year old negro is accompanied by 4 roentgenographs and an excellent clinical discussion. The patient was seen first by the authors in March, 1941, with tuberculosis of the chest. Two months later, a fusiform, painless, progressive swelling of his left index finger was observed. Roentgenographs of the finger in 1942 revealed an elevation of the periosteum and cortical irregularity along the proximal phalanx of the left index finger. Soft tissue about the bone also assumed a fusiform shape. A second roentgenograph was taken in September, 1943 because of persistent pain and swelling. This revealed rarefication of the proximal phalanx of the left index finger with expansion of the bony cortex, or the so-called spina ventosa.

A fortnight later the patient reported for further observation. In addition to the previous roentgenologic manifestations alluded to, he had sustained a pathologic fracture of the affected finger. Despite the patient's condition, he passed a navy physical examination, only to be discharged a month later.

In 1944 he returned to the outpatient department where, after a thorough examination, the authors performed an amputation of his left index finger. Histologic examination revealed typical Langhans giant cells in the tubercle mass.

The differential diagnosis, according to the authors, should include: (1) syphilitic dactylitis, which is polyostotic, (2) enchondromas, (3) osteitis, (4) Boeck's sarcoid, (5) coccidioidomycosis, (6) leprosy, (7) yaws, and (8) osteomyelitis.

Tuberculous dactylitis in children differs from that in the adult in that in the former the disease is concomitant with other organic disease, whereas in the latter the malady is not a part of a generalized process. Moreover, fistula formation is the rule in children, but no fistulas are found in adults. Amputation is the treatment of choice.

SAMUEL L. GOVERNALE, M.D.

SURGERY OF THE BONES, JOINTS, MUSCLES, TENDONS, ETC.

Outland, T., and Corn, O.: The Use of Parallel Grafts and of Two-Stage and Three-Stage Interlocking Grafts in the Treatment of Idiopathic Scoliosis. End Results in 41 Cases. *J. Bone Surg.*, 1947, 29: 163.

The greatest need in severe or progressive scoliosis is not a method of correction but the maintenance of the correction. In a large series of cases, correction was attained in 61 per cent, but pseudarthrosis occurred in 28 per cent. Delayed fusion occurring after most of the correction has been lost is a problem which must also be solved. The authors present a method of fusion designed to improve the results in this regard.

For short curves (5 to 7 vertebrae), rigid tibial grafts are placed on both sides of the spinous processes. In longer curves the grafts are overlapped at the middle to give maximum strength at that point (two-stage interlocking graft). For the very long fusions a three-stage interlocking graft is used. This is applied by putting the first graft along one side of the spinous processes, the second graft on the other side, and the third graft on the original side, each graft overlapping by at least 2 vertebrae. The lateral articulations are not attacked, but the grafts are laid subperiosteally against the spinous processes and laminae, and the spinous processes are undercut and turned upside down to come into close contact with the graft.

Among the 41 cases of idiopathic scoliosis in this series there was no mortality, and only 3 (7.3%) fractures of the graft occurred. One patient fractured the donor tibia and another developed a mild infection in the donor leg. There were other complications not related to the surgery.

The scoliosis with a double primary curve is discussed. The authors favor correcting both curves as far as possible with a Risser jacket hinged at two levels. The thoracic curve is corrected first, then the lumbar. The whole area is then fused.

The final results shown in the series presented (43% improvement) are much better than the results given by the Research Committee of the American Orthopedic Association (25% improvement).

The authors warn against the danger of persistent conservative methods without accurate and frequent

measurements by means of x-rays. These methods should certainly not be continued until a mild curve becomes moderate or severe.

The Risser jacket was the most effective method of correction of the severe curves. In 2 less severe cases the Lemesurier hammock suspension afforded excellent correction.

Some good x-rays and photographs are reproduced to illustrate the various points of this article.

NEWTON C. MEAD, M.D.

Mezzari, A.: Cure of the Postpoliomyelitic Flexion Adduction Deformity of the Hip (Sulla cura dell'anca flesso-abdotta poliomielitica). *Chir. org. movim.*, 1946, 30: 383.

Three types of postpoliomyelitic contracture about the hip are described: the flexion abduction contracture, the surgical correction of which the author discusses, the flexion adduction contracture, and the mixed forms of contracture. Of these, the first is the most common. Most of the efforts to prevent the flexion abduction type of contracture with outward rotation at the hip and consequent obliquity of the pelvis to maintain the erect position of the body are rendered fruitless by the young child's habit of flexing the hip in sitting and walking on all fours. Other methods have been proposed to correct the paralysis of the adductors and flexors of the thigh. However, no method has been devised against the outward rotation contracture and no method has been devised which tends to establish a functional counteraction against a possible recurrence of the original deformity. The author's method, which he believes to be original with himself, consists essentially in detaching the sartorius and tensor fasciae latae muscles at their proximal attachments and transferring them medially by means of subcutaneous tunneling to a new attachment on the pubic tubercle. Thus the sartorius becomes an adductor and the tensor fasciae latae muscle an inner rotator, and after re-education they assume an active role in correcting the abnormality and guarding against recurrence.

The method has been employed by the author in 25 children from 7 to 14 years of age, the first time in 1934. Judging from the patients who were operated upon sufficiently long ago, the pelvofemoral position is found to have been corrected and there is no tendency toward recurrence. Both functionally and esthetically the author considers the results to be sufficiently encouraging to justify his reporting them at this time.

JOHN W. BRENNAN, M.D.

Murray, C. R.: Treatment of Injuries to the Knee Joint. *N. England J. M.*, 1947, 236: 265.

Stabilization of the knee joint is accomplished, not by various ligaments, but by the co-ordinated action of the surrounding muscles. Any injury to the intra-articular portion of the knee joint is associated with a rapid hypotonia that is relatively selective for the extensor mechanism of the joint.

If examination, which should always be done with the thighs thoroughly exposed, shows there is no visual, palpable, or measurable hypotonia or atrophy of the thigh, there is probably no lesion involving the knee joint, and it can be assumed that the lesion lies outside of the joint. If there is hypotonia and atrophy of the thigh muscles soon after injury, the pathology lies within the joint.

Whenever a knee joint develops fluid within a matter of hours after injury, the condition is hemarthrosis and not traumatic synovitis.

Range of extension is a primary consideration. With the heel resting on the examiner's knee, the knee should completely extend. If it does not, muscle spasm or mechanical block is the cause. Spasm may be secondary to fluid in the joint.

Flexion due to spasm and fluid can be overcome by steady pressure, but on release of the pressure the knee rebounds into flexion. Normal knees do not rebound. If, because of the severity of pain or mechanical obstruction, the joint cannot be straightened, there is probably a mechanical derangement of the knee joint.

Sprains of the ligaments, when not accompanied by hemarthrosis, are not accompanied by rapid hypotonia and loss of thigh contour. If there are actual ligament tears they are evidenced by abnormal mobility of the joint in full extension.

Cruciate tears are less important than collateral ligament injuries. They rarely require surgical repair and should be treated by restoring the quadriceps mechanism.

The diagnostic feature of meniscus injury is a sudden, twisting effort, with the knee flexed, that results in localized pain on the inner or outer side of the joint, often followed by a sudden accumulation of fluid (hemarthrosis) and tenderness at the site of pain, and there may or may not be locking. A locked knee must be unlocked before it is immobilized. Any manipulation should be done under an anesthetic. The method of reduction consists in first flexing the knee and hip to right angles. The tibia is rotated loosely inward and outward on the femur and then adducted and abducted. Following this the knee is brought into sudden extension.

The author believes in radical surgery if there are signs of a meniscus tear even if the joint is not locked. This should not be done for a first injury, however. Perfect results are not always obtained from surgery.

The patients with meniscus injuries in whom operation is not performed should be treated by placing the knee in an extension cast and made to walk without crutch or cane so as to develop the thigh by co-ordinated muscle activity. When this is not possible the quadriceps contraction exercise, a poor substitute, must be used. The cast is worn about 4 weeks, after which normal function is started. The patient is taught to forget flexion, but to develop extensor power.

Immobilized joints become stiff because of a loss of elasticity and thickening of the capsular structures. This is the result of loss of minute circulatory efficiency due to absence of normal muscular activity. The joint does not have to move to remain limber,

but the muscles must be kept moving if the minute circulation of the part is to approach normal.

The author believes it is impracticable to make a clear cut and definite preoperative diagnosis in cases of internal derangement of the knee joint. He explores the joint thoroughly through a long incision, without a tourniquet, with the patient in a high Trendelenburg position. The parapatellar incision extends from the upper limit of the suprapatellar pouch to the tibial margin. Only 30 per cent of a series of 400 patients with internal derangements had meniscus injuries alone. Another 30 per cent had some other lesion, such as torn crucial ligament, or a synovial or fat pad lesion, in addition.

Postoperative care is not complicated by the long incision. The joint is kept moving, but no violent or forced exercises or exercises to fatigue limits or beyond pain limits are permitted. Immobilizing the knee postoperatively may result in stiffness of the joint, and should not be done. The more exercise undertaken by the muscles activating the knee joint, within physiological limits, the better off the patient.

When an injury to the meniscus has cleared up under conservative treatment and the joint is again injured several months later, the same conservative treatment is not repeated. A tear limited to the meniscus will never heal, but it usually heals if it is in the ligamentous structures uniting the meniscus to the margin of the tibia. Recurrent injuries may be assumed to be tears through the cartilage which have not healed. Operative treatment is indicated. It is not wise to wait for multiple recurrences as these damage the articular surfaces.

Discussion of this article brought out several more points, among them, that the author routinely removes the fat pad when he operates upon mechanically deranged knees. NEWTON C. MEAD, M.D.

Parker, J.M., and Modlin, J. J.: Compound Injuries of the Knee Joint. *Ann. Surg.*, 1947, 125: 341.

Early exploratory arthrotomy was found to be the treatment of choice in compound injuries of the knee joint. This observation is based on approximately 300 compound injuries of the knee joint treated in the Mediterranean and European theaters of operation. In the forward hospitals arthrotomy of the injured knee joints was carried out at the earliest possible time. Any intra-articular loose or foreign body was removed. The synovial membrane was closed. The soft parts were débrided but not sutured. Penicillin was administered intra-articularly and followed up by parenteral injections. The extremity was then immobilized in a hip spica or Tobruk plaster cast.

This article is chiefly concerned with the treatment of joint injuries at the base hospitals. The general condition of the patient is rapidly brought to a state in which further operative treatment is possible. In the operating room the dressing is removed for the first time since its application. The uninfected knee will have diminished but painless motion. The patient is then anesthetized. Any excess intra-articular fluid is aspirated and cultured. Gentle irrigation of the joint cavity with saline solution is carried out. Should arthrotomy be indicated it should be carried out with the use of a tourniquet. Twenty thousand units of penicillin in from 10 to 20 c.c. of saline solution are instilled into the joint cavity. The skin is then closed.

The usual uncomplicated knee injury is immobilized with traction for from 5 to 7 days. Systemic administration of penicillin is continued. In cases with favorable response, the intra-articular effusion, periarticular swelling, and elevated temperatures disappear within 2 or 3 days. Early mobilization and exercises are very important in the after-care of clean wounds of the knee joint. Quadriceps atrophy and the formation of adhesions in the joint are prevented.

More than two-thirds of the injured knees were complicated by fractures of the condyles or the patella. Total patellectomy is indicated in severely comminuted fractures of the patella. In cases in which a major fragment with a good articular surface remains, it may be left *in situ* after excision of the smaller comminuted fragments.

Condyles usually show only minor fractures, i.e., penetrating injuries, chip fractures, or incomplete fractures. Any missile should be removed when at all possible. It may be hidden under portions of elastic cartilage which have retracted over it. Irregularities of the condyles are smoothed down and loose fragments are removed. Severely comminuted fractures of the condyles are treated with skeletal traction or plaster immobilization to await solidification of the fragments. Fusion at a later date usually is necessary.

Loss of the soft parts around the joint often makes it impossible to approximate the wound edges. In cases in which the cartilaginous and bony portions of the joint are intact, early plastic repair of the wound should be carried out. This can be accomplished by swinging a wide based pedicled flap over the defect or by shifting undercut adjacent skin over the soft tissue defect.

It was definitely established that compound injuries of the knee joint due to shell fragments showed a much higher degree of infection than those caused by bullets. Therefore, even a highly shattered joint caused by a bullet should be treated conservatively since it is not likely to become infected.

Accurate data were compiled concerning 244 patients with compound injuries of the knee joint.

GEORGE I. REISS, M.D.

FRACTURES AND DISLOCATIONS

McCarroll, H. R.: The Use of Small Threaded Wires in the Treatment of Fractures. Fractures of the Upper Extremities. *Arch. Surg.*, 1947, 54: 154.

The author advocates the use of the threaded wire in fractures of the clavicle, dislocation of the acromioclavicular joint, and fractures of the proximal end of

the humerus, particularly when the tuberosities are displaced. The surgical or the anatomic neck of the humerus may become badly displaced. As a rule, open reduction may be carried out through a small incision anteriorly, and adequate approximation of the two fractures can be maintained by the use of 2 threaded wires drilled through the tuberosity and into the medullary canal of the distal fragment. If there is any fear of the wire's wandering farther into the medullary canal, this can be easily prevented by the application of a nut to the projecting portion of the threaded wire.

The wires are also used for fractures of the epicondyle of the humerus with displacement. These fractures usually require open reduction. The fragment is held firmly in place with a towel clip, and a small threaded wire is drilled through the fragment and into the humerus. This affords excellent fixation. This wire is cut off flush with the surface of the epicondyle and is not removed. Plaster fixation of the extremity is necessary for from 6 to 8 weeks.

The wires are also useful in fractures of the olecranon. If such fractures are displaced, open reduction is indicated. In this way, the contour of the articular surface can be restored and the interposed periosteal flap, so frequently stripped from the cortex at the time of the fracture, can be removed, which facilitates accurate reduction and apposition of the fragments. This is done through a small overlying incision; the fragments are reduced and realigned exactly as in a jigsaw puzzle and are held firmly in place with a towel clip. A threaded wire is then drilled through the fragment and into the ulnar shaft.

In fractures through the neck of a metacarpal with angulation of the metacarpal head to the flexor surface, a wire is passed through the distal fragment and into the medullary canal of the metacarpal, after accurate open reduction. A small incision is placed along one margin of the involved metacarpal. The wire is inserted through the distal fragment at the margin of the articular cartilage in order to disturb the structure of the joint as little as possible. In fractures of this nature the wire is always allowed to protrude, and it is removed in 4 weeks. No external fixation is needed, and this permits early institution of active and passive exercise in these hands, an all important factor in preserving function.

C. FRED GOERINGER, M.D.

McCarroll, H. R.: The Use of Small Threaded Wires in the Treatment of Fractures. Fractures of the Lower Extremities. *Arch. Surg.*, 1947 54: 138.

The author advocates the use of small threaded wires in the treatment of fractures of the lower extremities. Such a wire affords excellent fixation and it causes a minimum amount of trauma to the bone and soft tissues compared to other forms of internal fixation. Screws are too large for fixation of small fragments and often result in their comminution. The smooth Kirschner wire does not hold as well. The threaded wire combines the desirable features of the two and it is by far the most ideal aid.

The Kirschner type of wire and traction bow has always seemed objectionable; first, because the bow rested across the front of the leg below the knee and thus made it impossible to place the knee in complete extension when desired, and, second, because there was invariably a tendency for lateral play of the wire through the extremity, and this resulted in some infections. Wires of this type and the bows from the leg lengthening apparatus were used for ordinary skeletal traction in many cases.

This method has been used over a period of 10 years for skeletal traction in several hundred cases. The method has proved satisfactory in every respect. With the threaded wire, no tendency for the wire to wander has been encountered. When the wire is used for fixation of heavy cortical bone, however, as in transfixation of the fragments of spiral or oblique fractures of the long bones, it has been found that preliminary drilling of the wire tract is an essential step. Before this was learned an attempt was made to force the pointed threaded wire through these fragments of heavy cortical bone with a motor drill. It was found impossible to control the speed of the wire to make the rate of introduction correspond exactly to the number of threads per inch (2.5 cm.) on the wire. In cortical bone, preliminary drilling with an 0.070 inch drill point (No. 50 of the standard drill point gauge) for use of the $\frac{3}{32}$ inch threaded wire, and a 0.067 inch drill point for the 0.086 inch wire insure solid fixation. The wire is simply drilled in for the required distance and cut off when desired. With preliminary drilling of this type, the hand drill is preferable and is always used both for the drilling and for the insertion of the wire; pointing of the wire is not necessary. When used without preliminary drilling, pointing of the wire is essential.

In the treatment of fractures of the malleoli, the authors use the threaded wire for fixation incorporating the blunt end of the wire and the plaster. Several weeks postoperatively the wire is readily removed. It has been utilized for spiral or oblique fractures of the long bones. For fractures of the tibia and fibula, threaded wires afford excellent fixation. These wires have also been used for similar fractures of the femur, but have proved entirely unsatisfactory. They will not withstand the force and strain to which they are subjected in a fracture of the shaft of the femur. For this fracture, simple skeletal traction is far superior and is preferable, as has been pointed out by many authors previously. C. FRED GOERINGER, M.D.

Quigley, T. B., and Urist, M. R.: Interphalangeal Joints. A Method of Digital Skeletal Traction Which Permits Active Motion. *Am. J. Surg.*, 1947, 73: 175.

Recent experience has re-emphasized the necessity for maintenance of active motion throughout the treatment of fractures of the metacarpals and phalanges. While anatomic reposition is desirable, function is more dependent upon a minimum of splinting both as to extent and time than upon elimination of bony deformity. The relatively greater area of

joint surface and mechanisms in the small joints of the hand predisposes them to rapid development of stiffness.

Manipulative reduction maintained by various types of traction is often the treatment of choice although the usual means of traction prevent active motion. Common sites for traction in the finger are: (1) the fingernail, (2) pulp of the distal phalanx, (3) the distal phalanx, (4) the middle phalanx, and (5) the proximal phalanx. All of the sites present disadvantages either with regard to the production of pain or possible damage to important structures.

On the dorsal surface of the middle phalanx there is a triangular space where only skin and fascia overlie the bone, and this is a logical place for the insertion of skeletal traction. Through a stab wound the cortex is drilled at an angle of 45 degrees distally with a No. 6 dental burr. A hook fashioned from a Kirschner wire is engaged through this hole in the cortex and steadied by a small dressing. It is attached by rubber band traction to a banjo splint anchored in plaster. Active motion is insisted upon, which, although not over a great range, is sufficient to avoid "freezing" of the joints.

From experience with 70 fingers so treated it was found best to place the fingers in traction in flexion, as recommended by Bunnell. Mobilization is no more rapid than from the extended position, but the functional position permits use of the hand while mobility is being re-established. Traction is rarely maintained for more than 3 weeks. This method is best suited for fractures of the proximal interphalangeal joints, proximal phalanges, and unsupported metacarpals. Three cases are reported demonstrating use of the technique in compound comminuted fractures of the second, third, fourth, and fifth metacarpals; compound fractures of the third and fourth proximal phalanges; and simple fracture of two-thirds of the distal articular surface of a proximal phalanx. FRANCES E. BRENNECKE, M.D.

Olives, V. B.: Epiphyseal Slipping of the Head of the Femur (Desprendimiento epifisario de la cabeza femoral). *Rev. espan. cir.*, 1946, 5: 158.

The causes of epiphyseal slipping may be divided into three types: the purely traumatic, the static, and the type in which there is decreased resistance of the cartilage due to general or local causes.

The lesion is more frequent in the male, but more pronounced in the female. The location is practically constant. Bilateral affection, however, is rare. The disease goes through three stages: a latent or prodromal period characterized by pain; a progressive period which leads to a solidification of the epiphysis to the neck of the femur; and the formation of a coxa vara.

The most frequent complication is an aseptic necrosis of the femoral head.

Diagnosis presents some difficulties. Differentiation must be made from subcapital fracture and Perthes' disease. Prognosis depends upon the severity of the disease process and early treatment.

Treatment depends upon the phase of the disease. In the prodromal stage, traction, abduction and internal rotation may be sufficient. Later, intra-articular or extra-articular osteotomy must be resorted to before any practical results can be obtained.

STEPHEN A. ZIEMAN, M.D.

Boyd, H. B., and George, I. L.: Complications of Fractures of the Neck of the Femur. *J. Bone Surg.*, 1947, 29: 13.

The authors report a statistical study of 300 cases of fracture through the central portion of the neck of the femur operated upon by the staff of the Campbell Clinic. Smith-Petersen nails were used in 285 of the hips and Knowles pins in 15. All impacted fractures and fractures of the base of the neck were excluded.

The postoperative follow up of 131 cases was less than 1 year on account of various factors, such as distance from the Clinic, age, debility, lack of funds, and transportation difficulties. Twenty-eight of the patients died (Table I).

The report on bony union or nonunion is therefore based on 141 cases; in 122 (86.5%) union occurred and in 19 (13.5%) it did not occur (Table II).

Aseptic necrosis and degenerative changes of arthritis following bony union occurred in 33.6 per cent of the cases, but all cases of aseptic necrosis did not have arthritic changes, whereas a few cases without aseptic necrosis did have arthritic changes. Aseptic necrosis can be detected in the roentgenograms within 1 or 2 years following fracture (Tables III and IV).

TABLE I.—MORTALITY

Age	Number of hips	Deaths	
		Number	Per cent.
Under 40	15	0	0
40–59	50	0	0
60–69	92	5	5.4
70–79	87	9	10.3
80–96	56	14	25.0
Totals	300	28	9.3

Of the total number of deaths, 21 occurred in less than 4 weeks after operation, and 7, within 4 weeks to 6 months after operation.

TABLE II.—BONY UNION

Age	Union		Non-Union	
	No. of hips	Per cent.	No. of hips	Per cent.
Under 40	11	100.0	0	0
40–59	31	91.0	3	9.0
60–69	42	78.0	12	22.0
70–79	23	92.0	2	8.0
80 and older	15	88.0	2	12.0
Totals	122	86.5	19	13.5

TABLE III.—CHANGES FOLLOWING UNION

Follow-up period	No. of hips	Aseptic necrosis		Arthritic changes			
				Moderate		Severe	
		Number	Per cent.	Number	Per cent.	Number	Per cent.
1–2 years	84	28	33.3	13	15.5	6	7.1
Over 2 years	38	13	34.2	10	26.3	12	31.6
Totals	122	41	33.6	23	19.0	18	14.6

TABLE IV.—END RESULTS

		Per cent
Mortality		9.3
Poor End Result		
Non-union	13.5	
Severe arthritic changes	14.6	28.1
Fair End Result		
Moderate arthritic changes		19.0
Good End Result		43.6
Total		100.0

The data presented in this article indicate that the total number of patients with severe arthritic changes in the hip will exceed the number with nonunion. In the future, the problem of rehabilitation and treatment of the patients with severe degenerative arthritic changes may become more important than the treatment of those with ununited fractures.

DANIEL H. LEVINTHAL, M.D.

Sherman, M. S., and Phemister, D. B.: The Pathology of Ununited Fractures of the Neck of the Femur. *J. Bone Surg.*, 1947, 29: 19.

Nine case histories are presented, some in abstract and others in detail. The essential factor in these cases was the ununited fracture of the neck of the femur. The original articles contain 42 figures showing roentgenograms and photomicrographs of the involved structures and discusses the findings, facts, and theories of other investigators.

The incidence of nonunion is quite high in intracapsular fractures of the neck of the femur except in the cases which have been impacted or treated by accurate open or closed reduction and internal fixation. The factors responsible for this relatively high incidence are: death of the head fragment due to disruption of the blood vessels of the neck, displacement of the fragment ends, poor immobilization, and failure of peripheral callus formation.

If the head fragment survives, it undergoes atrophy to the same degree as the distal fragment. Treatment in this type of case is usually successful and extensive degenerative changes in the joint do not occur. If the blood supply to the proximal fragment is severed and the head dies, the head will appear to be more dense than the surrounding atrophic living bone in the roentgenogram. There is slow invasion of the head by vascular fibrous tissue. The necrotic bone is absorbed and is replaced by cancellous new bone. The necrotic articular cartilage remains unaltered until a new blood supply reaches it, at which time it is replaced either by an imperfect type of fibrocartilage, or in part by bone. Transformation of a dead head takes place first at the margins of the fracture and the fovea. A pathological fracture between the dead and living portions may result in collapse and delayed union or nonunion. If union has occurred in the presence of a dead head and if weight bearing is begun before replacement is complete, the head will probably collapse and degenerative changes will be present on both sides of the joint. If the head is adequately protected, it may not collapse. The degenerative changes are minimal and a good functional result is obtained.

RICHARD J. BENNETT, JR., M.D.

ORTHOPEDICS IN GENERAL

Lamas, A., Amado, D., Celestino Da Costa, J.: The Blood Supply of Bone (La circulation du sang dans l'os). *Presse méd.*, 1946, No. 63: 862.

This article is based on experiments on animals carried out in the laboratory organized by Reynoldo dos Santos. Studies on the blood supply of bone have been neglected somewhat although it is of great importance in the study of the physiopathology of bone. In spite of a number of attempts it was impossible to visualize a "bone artery" by means of arteriography. Hundreds of arteriographs were taken and several different methods were used, with the result that every artery in the soft parts was visualized but not a single "bone artery." Larger doses of contrast medium were used and serial roentgenograms were taken, but without success.

Arterial therapy also shows different effects in infections of the soft parts as compared with infections of bone. The therapeutic effect of penicillin given by the arterial route was very good in cases of soft tissue infection but showed no results in infections of bone. The arterial route was used in 2 patients with a severe infection of the forearm and of the thenar region and 2 patients with osteomyelitis. After 3 or 4 intra-arterial injections of from 15,000 to 20,000 Oxford units of penicillin the infection in the soft parts healed completely without surgical intervention. In the cases of osteomyelitis, however, there was no change in the disease in spite of the fact that much larger doses were used.

The analogy of the results of arteriography and arteriotherapy appeared significant. It was not the insufficiency of the blood supply in bone which explained these facts. Arteriographs of bones in the cadaver were unsuccessful unless the efferent vein was ligated (Lexer). It was found that there was a large arterial network in bone as well as "blood lakes," and these findings were confirmed by histological studies made by the authors. Another well known but little emphasized fact is that blood does not spurt but only dribbles from a cut surface of bone; this has been frequently observed in amputations and trephine openings.

A search of the literature for an explanation of these observations was unsuccessful. Leriche in his "Treatise on the Physiology and Pathology of Bone" stated that the circulation slows down when entering the bone. This slowing down should be brought in accord with physiological requirements. In addition to being a depot for calcium, bone has two functions: one of support and the other of hematopoiesis. None of these functions requires an active circulation. The calcium metabolism is slow and it is regulated by glands of internal secretion. When the "bone is doing work," i.e., when the extremity is in motion, it is not subject to any change and there is no need for an increase in its blood supply such as observed in the adjacent muscles. Its function of support is of a static nature. It operates like a lever. There is no evidence of contraction like in a muscle. There is no evidence of sudden changes within the bone which would require an active circulation.

As far as hemopoiesis is concerned, a rather slow flow of blood is necessary; this can be interrupted for short periods to allow young blood elements to enter the bloodstream at a rate dictated by the needs of the organism. In the spleen, which has a similar function, the circulation often comes to a standstill. The experiments of Kniseley and Husch show clearly that sphincters are placed at the entry and exit of every spleen sinus to stop the bloodflow in order to give the circulatory elements a chance to pass the vessel walls. All this indicates that the circulation actually slows down in bone, but it does not explain the ineffectiveness of arterial therapy and the inability to demonstrate the arteries in an arteriograph.

Carmine injected into the external iliac artery of a dog appeared in a soft tissue wound after 4 seconds, in the skin after 7 seconds, and on the cut surface of the bone marrow after 1 minute (it never appeared in the compact portion of the bone). The color of the dye was very pale in the bone marrow as compared with that in the skin. These experiments indicate that the circulation in bone is slower and that substances entering bone via the arteries get there in small quantities and become greatly diluted.

Histological studies show that the arteries in bone are constructed differently than arteries in the soft tissues. The nutrient artery of bone has a thick wall, thick intima, and a small lumen as compared with its size. Before entering the bone it describes a number of curves and then divides into two branches. Its ascending and descending branch supplies the bone marrow and probably some haversian canals. Finally it opens into the "blood lakes" near the epiphysis. Large veins with very thin walls leave these blood lakes. These veins unite to form the vein which accompanies the nutrient artery. Its lumen is large as compared with the lumen of the nutrient artery. There are hardly any blood vessels in the periosteum of the diaphysis. The arteries lying in the haversian canal have a single endothelial layer of cells surrounded by a sparse layer of mesenchymal tissue.

The curves in the nutrient artery are responsible for the slowing down of the blood flow. A further slowing down of the blood stream is accomplished by the division into many branches. It looses its pulsating character and by the time it reaches the capillaries the blood flows slowly and evenly. The same happens if the blood is forced to run through collaterals, but the pulsating character is lost much sooner.

There is another reason why there is no pulsation of the arteries in the bone. The arteries are enclosed in a rigid frame of compact bone. Physiological, pathological, or therapeutic vasodilatation cannot occur as it does in other tissues. Sympathectomy causes some changes in the arteries in the bone. The arteries of the bone have also an adventitia but it is quite dissimilar to the adventitis arteries of the soft tissues. It is quite possible to prevent contraction of the artery in the bone but dilatation is very unlikely to occur. The narrow lumen of the nutrient artery admits only a small quantity of blood at a given time, and the winding of the artery, its division into numerous branches, and its course in a rigid frame make the blood circulate under low tension and without pulsation. In addition, it stagnates in the blood lakes and large veins. These facts explain why the arteries cannot be visualized on the arteriographs and why drugs placed in the blood stream have no appreciable therapeutic effect in case of infections of bone.

These observations do not clarify the physiopathological problems of bone but show them in a different light. It is quite likely that changes in bone attributed to ischemia are really due to blood stasis.

Some pathological conditions of bone need a great deal of blood which cannot be supplied by the bone arteries. The arteries are unable to dilate and to furnish the nourishment required by the lesion. In these cases the arteries of the surrounding soft parts multiply and hypertrophy. This happens very frequently in tumors. It is quite possible that bone tumors originate in the soft parts since bone is unable to furnish the necessary blood supply. Furthermore, the arteries of the soft tissues are unable to perforate healthy compact bone to get to the tumor.

It is possible that the tumor originates in the periosteum or subperiosteal tissues and eventually invades the bone. GEORGE I. REISS, M.D.

Wolbach, S. B.: Vitamin-A Deficiency and Excess in Relation to Skeletal Growth. *J. Bone Surg.*, 1947, 29: 171.

Deficiencies of vitamins A, C, and D affect bone growth directly. Deficiency of vitamins A and D involve epiphysial cartilage cell activities. Vitamin C deficiency in growing animals affects all collagenous structures. Vitamin A is unique in that, when given in great excess, it actually accelerates normal growth sequences. The acceleration bears quantitative relationships to the amount of vitamin A administered.

The deposition of bone by cells of the endosteum and periosteum is called appositional bone formation. The growth of membranous bones is entirely by appositional bone formation.

Endochondral bone formation sets the pace and the pattern of skeletal growth.

Vitamin C deficiency prevents bone formation by causing a failure of matrix formation, specifically a failure in the synthesis of collagen. Administration of Vitamin C to guinea pigs totally deficient in this vitamin is followed by the prompt deposition of collagen and the formation of the matrices of connective tissue, bone, and teeth.

Vitamin D deficiency results in a failure of the bone matrix (osteoid) to calcify. Efficient concentrations of calcium and phosphorus ions in the blood plasma are not maintained.

The cytomorphosis of the cartilage cells is disturbed, in that they fail to complete the normal sequence which ends in degeneration and death. The epiphyseal cartilage accumulates. There is no ingrowth of capillaries to fill the spaces which normally result from the disappearance of cartilage cells. Administration of Vitamin D is rapidly followed by a resumption of cytomorphosis, extensive penetration of capillaries, and concurrent calcification of the adjacent matrix. Thus, in rickets two separate processes are involved. One is the failure of epiphyseal cartilage cells to complete the sequences of proliferation, maturation, and degeneration, and the other is the failure of matrices to calcify.

Hypervitaminosis-D as produced by the administration of excessive amounts of activated ergosterol leads to a great rise in serum calcium. If the alimentary source of calcium is not adequate, calcium is obtained through the resorption of bone. The stoechiometry of blood calcium seems to have quantitative relations to the amount of vitamin D introduced. The maintenance of high calcium levels in rats through its use results in short bones with noncalcified trabeculae of unusual thickness and number at the diaphyseal ends, and resorption of cortical bone, with noncalcified matrix deposition of periosteal and endosteal origin. By some authors this is regarded as a rachitic type of change.

Vitamin-A deficiency results in a cessation of all cellular sequences in the epiphyseal cartilage. Osteoclasts absorb the cartilage trabeculae which were calcified before the deficiency was established.

Dense calcification of the matrix of the diaphyseal border of the epiphyseal cartilage results in a thin plate of bone across the face of the epiphyseal disc. The cessation of bone growth is not accompanied by cessation of growth in other tissues, and in young experimental animals the central nervous system, which grows, becomes paralyzed as the result of mechanical pressure within the skull, which does not grow.

Remodeling of young bones ceases and appositional bone formation continues, which results in short thick bones. The appositional bone growth is in strict conformity to normal growth patterns until inanition supervenes. The pressure on the nervous system is not due to excessive appositional bone growth.

Hypervitaminosis-A results in a great acceleration of all processes of growth which can be followed microscopically and specifically, with regard to the epiphysiocartilage sequences and in the resorption of bone and appositional bone formation necessary in the remodeling of bone in skeletal growth. Fractures are produced in from 6 to 10 days by the accelerated remodeling process. When large amounts of vitamin A are given, the linear growth rate of bone is retarded, and there is a decrease in food consumption and growth of the animal (rat) as a whole. The larger the amounts of vitamin A administered, the greater is the retardation of growth and the greater is the rate and frequency of fracture.

There is no increase in the rate of multiplication of the cartilage cells, but there is an increased rate of growth, maturation, and death. The author concludes that some agent is released by this process which is responsible for the remodeling process of bone growth. He discards the explanation that it is a response to mechanical stimulation.

The description of the microscopic changes which are presented in considerable detail does not lend itself to condensation.

Fractures of long bones are easily accounted for by the extensive loss of previously formed cortical bone before the newly deposited bone has acquired strength. They occur at sites where remodeling in normal growth is most active. The new bone is not firm because its matrix has failed to mature or completely calcify.

A study of the ductless glands of animals with an excess of vitamin A revealed no demonstrable changes in the pituitary, thyroid, or parathyroid glands. Changes were seen in the adrenal glands, but their significance is not known for certain.

The dosages of Vitamin A in these experiments were tremendous, and were not compatible with life.

NEWTON C. MEAD, M.D.

Wittkower, E.: Rehabilitation of the Limbless; A Surgical and Psychologic Study. *Occup. M.*, 1947, 3: 20.

This article well describes a useful approach to the limbless patient on the part of all those individuals who must deal with him.

The patient who has lost a limb naturally mourns his loss and must frankly show it or hide his grief behind a wall of psychological defense; hence, he requires skillful handling of his depression based on understanding of its fundamental nature, and not pity, praise, or a "cheer up ol' man" approach.

In a study of 200 amputees the following types of reaction were noted: 15 per cent showed persistent depression, over and above the transient depression experienced by the majority; 21½ per cent became impatient, irritable, ill tempered, and resentful; no matter what was done for them, these patients remained dissatisfied and discontented, full of resent-

ment toward the doctors, the hospitals, the government's provision for their care, and even toward themselves; 5½ per cent developed excessive anxiety about the future, doubting their working capacity, and the chance of making a living; 21½ per cent of the patients reacted to their disability with defiance; these individuals were uncommonly ambitious and were determined "to make the best of a bad job." Some 14 of the 43 members of the last group showed cracks in the carefully built-up facade by complaining of sleeplessness, nightmares, irritability, trembling, and crying fits.

Cheerfulness was the reaction characterizing 24 per cent of the patients and was very common in the early phases of the severely disabled. Genuine satisfaction over the loss of a limb in men who were thus expiated of a deep sense of guilt was rare. A few men were happy to pay such a price to get out of service. A small number showed no depression nor any protective measures against it.

The type of reaction depended upon a multiplicity of factors including the previous personality, the degree and site of the injury, the functional efficiency of the artificial limb, and the social and occupational situations. About 50 per cent of the patients studied were in a state of emotional maladjustment.

VERNON C. TURNER, M.D.

Dickson, F.: Industrial Injuries of the Back. *Occup. M.*, 1947, 3: 53.

Dickson divided the cases of backache seen in an industrial practice into four main classes, according to their etiology:

1. The first group consisted of strain or rupture of the muscles or ligamentous structures of the lumbosacral area caused by overuse (fatigue), excessive lifting, or direct trauma, and the condition was characterized by lumbar muscle spasm, localized tenderness over the affected region, and limitation of back motion. The author believes that if the strain is severe enough the patient should be hospitalized immediately for bed rest, traction, manipulation under anesthesia, injection of the trigger point with eucupin and procaine, and graduated exercises.

2. The second group presented arthritis of the lumbosacral joint. In this condition there are proliferative changes about the small joints and inelasticity of the ligaments. It is characterized clinically by (a) persistent dull aching low in the back, made worse by back motions; (b) limitation of motion of the lumbar spine; (c) referred pain, usually into the hips and lower abdomen; and (d) roentgenologic evidence of joint change in the spine.

Ankylosing arthritis of the spine must be differentiated from hypertrophic or traumatic arthritis. It is characterized by increase of pain on rest rather than activity, by a "poker back", by occurring in a younger age group, and by roentgen evidence of involvement of the sacroiliac joints as well as of the spine (in a later stage).

Treatment consists of bed rest, traction, physical therapy, exercise, and possibly a back support.

3. This group consisted of sprains and subluxations of the sacroiliac joint. Dickson finds this to be a very rare condition which is characterized by pain and tenderness directly over one or the other sacroiliac joint; a roentgenogram will show actual separation of the joint.

Treatment consists of bed rest with strapping and later a specially designed belt.

Sprains and subluxations of the lumbosacral joints are also included in the third group. These are the most frequent causes of back pain (other than arthritis) because of the frequency with which congenital abnormalities which weaken the joint, decrease its stability, and render it vulnerable to injury, are found.

4. The author believes that cases of protruded intervertebral disc complicating a previous weakness low in the back should have the benefit of exploration for the ruptured disc, its removal, and spinal fusion. The case of uncomplicated intervertebral disc should be subjected to excision of the ruptured disc, but no fusion. VERNON C. TURNER, M.D.

SURGERY OF THE BLOOD AND LYMPH SYSTEMS

BLOOD VESSELS

Christophe, L., and Honoré, D.: Arteriography by Injection and Automatic Taking of Negatives (L'artérographie par injection et prise de clichés automatiques). *J. chir.*, Par., 1947, 63: 5.

Increasing need for arteriography, not only in brain surgery but also in surgery of the extremities, induced the authors to invent an arteriographic apparatus. The apparatus, which appears complicated at first sight, can be operated by simple pressure of a finger on an electric button with the resultant intra-arterial injection of a contrast fluid and the automatic production of a negative taken at the moment of injection. In the apparatus there is a 30 c.c. syringe, the total capacity of which is rarely utilized. Thorotrast, as a contrast medium, has been discarded, because (1) certain autopsies revealed microscopic hemorrhages in the brain due to this medium; (2) radioactive substances are capable of causing delayed sarcomatous new growths, this having been observed after a single injection of 20 c.c. of thorotrast; and (3) thorotrast is manufactured by factories now in the Russian zone and therefore they were unobtainable until after the end of the war. In place of thorotrast, the authors use umbradil, which consistently gives good results and is entirely innocuous.

The apparatus permits the injection of very variable amounts of contrast fluid, at rates equally as variable. Three cubic centimeters can be injected in 10 seconds or 10 c.c. can be injected in 1 second. This adaptability of the apparatus permits the authors to use it not only for arteriography of the brain but also for arteriography of the aorta and of the arteries of the extremities. After aortography, when the authors are assured of the permeability of the iliac and crural arteries, a second injection into the femoral artery is made and a complete arteriogram of the lower extremity is obtained. Three exposures, one each of the thigh, leg, and foot, are made after one injection of the femoral artery.

The authors have come to use arteriography almost routinely on their surgical service. They use it especially in the study of the sequelae of serious brain trauma, in which cases epidural and subdural hematomas can be localized. It is used, also, in the treatment of diseases causing obliteration of the arteries. Systematic preoperative roentgenologic study of the peripheral arteries in cases of arteritis permits the selection of an operative procedure and aids in the prognosis in this uncertain and implacable affection.

Description of the apparatus. The apparatus is composed of a mechanism for injection and a system of automatic contacts.

In the injection mechanism (Fig. 1) an electric motor (A) pushes a metallic bar (B) at a variable speed by means of a circular ratchet, a metallic bar (B), and the extremities of the bar press upon the piston of a syringe (C). The progression of the bar assures the injection. The volume and the weight produced by the electric motor (A) are required for easy manipulation of the apparatus. The authors have been completely satisfied with a small motor of 24 volts, continuous, supported by a rectifier mechanism in the system.

The speed of the motor, regulated by a break (E), permits more or less rapid injection, according to the artery to be examined and the affection suspected. In order to allow easy manipulation of the bar of propulsion (for example at the moment of refilling the syringe), the cogged wheel, which sets the ratchet in motion, can be disengaged by means of a lever (F). At the moment when the apparatus is in use, the lever is brought down, the cogged wheel engages, and the apparatus is ready to function. The apparatus has, in addition, been improved by the use of the action of a magnet (G). A core of soft iron (H) attached to the end of the propulsion bar enters into

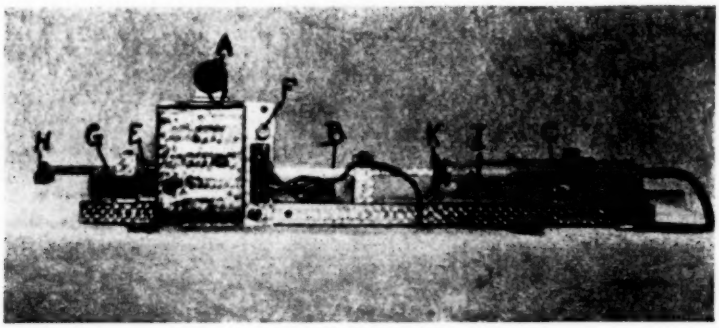


Fig. 1. (Christophe).

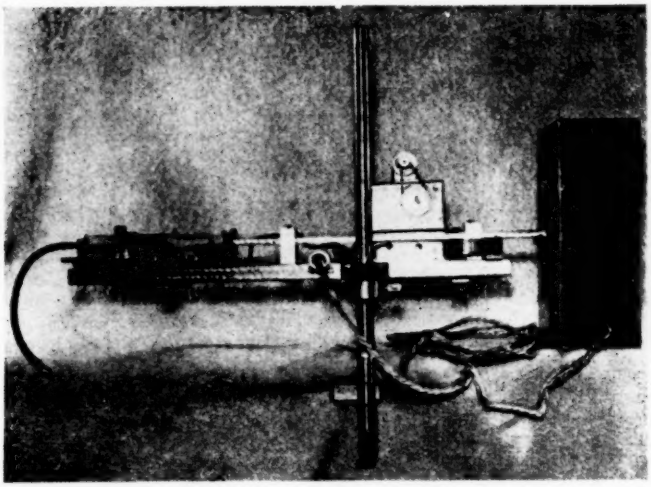


Fig. 2. (Christophe).

the field of this magnet at the time of the injection. It brings about the disengagement of the ratchet, avoids wear and tear, and prevents reflux in the syringe.

The entire apparatus is mounted (Fig. 2) on a hinged bracket, fixable to the roentgenographic table. It can be brought very near to the body of the patient.

The automatic release of the roentgen tube is composed of a slide contact placed parallel to the propulsion bar. The slide contact supports two platinum terminals which are separated from one another by a spring.

At the time of functioning, the stop (K) comes in contact with the slide contact, releases the spring, closes the circuit in the two terminals, throws the current in the electric magnet, and starts the roentgenographic apparatus.

It is necessary that the slide contact be mobile in order that the negative can be taken at the exact moment of injection.

Operation of the apparatus.

1. The electric circuit is checked.
2. The speed of the motor is regulated according to the caliber of the needle and the speed of injection desired.
3. The opportune moment for taking the negative is calculated. The slide contact is placed opposite the number of cubic centimeters which are to be injected.
4. The full syringe is put in place.
5. The propulsion bar is placed in contact with the piston and the ratchet is engaged by lowering the cogged wheel.

The apparatus is ready for use.

BLACKWELL MARKHAM, M.D.

Stewart, C. F.: War Experiences with the Nonsuture Technique of Anastomosis in Primary Arterial Injuries. *Ann. Surg.*, 1947, 125:157.

This article is concerned with the problem of restoring blood flow through arteries damaged by missiles. Seven cases of gunshot or shell fragment wounds of major arteries are presented. These were representative vascular injuries, demonstrating division of the artery in 3 cases, thrombosis in 2, and lateral laceration in 2. The author describes the use of a vitallium tube, lined with a vein segment which overlapped the ends of the tube. This is the method that was used in the cases that are presented. In all of these vessels a nonsuture anastomosis was attempted with varying results. The limbs of 3 of the patients survived. This makes a survival of 43 per cent in this group.

The author notes that it is futile to compare statistics in so small a series, and adds a record of the results of the major vascular surgery in the first half of 1945. Inclusion of the prosthesis cases in the statistics during this period raises the survival of limbs in cases of superficial femoral artery from 57 to 63 per cent. In the statistics for the brachial artery, this survival falls from 88 to 78 per cent, with failure in 1 prosthesis case. The statistics show that survival in the popliteal group rises from 0 to 11 per cent.

A discussion of technical difficulties and of possible improvements is given.

The author concludes the article by outlining the ideal treatment of a case with a lacerated, divided, or thrombosed artery as follows:

Preoperative treatment.

1. Shock treatment; morphine to allay pain; transfusions with proper type of blood to restore the blood volume.

2. Prophylactic treatment; antitetanic toxoid or serum with polyvalent gas gangrene serum if the conditions indicate it.

3. A sympathetic nerve block should be done on the affected side.

Operation

1. Wide and thorough débridement of the wound.

2. Clean isolation of the vessels involved and temporary local occlusion of the artery with rubber guarded clamps.

3. A cursory examination of the collateral circulation, which will give an idea of its ability to support the limbs.

4. Preparation of the prosthesis of adequate size from the adjacent vein; it must be reversed and one end kept marked.

5. Débridement of the ends of the artery and periarterial stripping 1 inch away from the divided ends.

6. Removal of all clots from the vessel ends and irrigation of them with a heparin-saline solution.

7. Insertion of the largest sized prosthesis that can be used, the procedure being started with the upper end of the artery and the upper clamp released to be sure that the flow passes through the prosthesis.

8. Firm double ligation of the arterial ends over the prosthesis with heavy silk.

9. Release of the occluding clamps.

10. Closure of the vascular sheath and wound whenever possible.

11. Local block of the nerves of the involved limb.

Postoperative care.

1. The blood volume should be kept up with whole blood transfusions as indicated.

2. Penicillin or chemotherapy should be continued.

3. The patient should be heparinized by subcutaneous injections of the drug in Pitkin's menstruum.

4. Repeated nerve blocks should be given as long as the state of the circulation is in doubt.

5. The extremity should be splinted in a neutral position for from 10 to 14 days.

6. The limb should be maintained at a subnormal temperature. HERBERT F. THURSTON, M.D.

BLOOD; TRANSFUSION

Tocantins, L. M.: The Mechanism of Hemostasis. *Ann. Surg.*, 1947, 125: 292.

This is an expository review of the existing knowledge of blood and vascular physiology, particularly integrating some of the facts that have been brought out during the past 10 years. Petit was among the first to call attention to the significance, in the spontaneous arrest of bleeding from wounds, of the plugging mass formed within and just outside of the opening of divided vessels.

In recent years, research and discussion on the mechanism of hemostasis and its disorders have been chiefly concerned with the coagulation of blood and the properties of the clot. The spontaneous arrest of bleeding involves more factors than those contributed by the blood alone. After a given injury the amount of bleeding will vary according to the prevailing efficacy of the hemostatic mechanism in the involved area. Moreover, factors which contribute to the continuation of bleeding in one section of the body may have a negligible influence in another.

At least three groups of factors may be said to be engaged in preventing or checking blood loss from the body: (1) extravascular factors, (2) vascular factors, and (3) intravascular factors.

EXTRAVASCULAR FACTORS

Location of the vessel. If the vessel runs close to the surface, with little or no tissue intervening between the vessel and the air, it is at some disadvantage insofar as hemostasis is concerned. This is particularly true in nasal bleeding. The small vessels coursing along the mucous or serous surface of the gastrointestinal, respiratory, or urogenital tract, or of any other hollow viscera, are likewise deprived of much support; therefore much blood may be lost.

Tissue tension or elasticity. Tension in the tissue surrounding the vessel wall protects it from damage and aids in resisting the flow of blood through the damaged site. The elasticity of the skin is thus an important factor in small cuts. In the aged elasticity is lacking. Vessels coursing through bone, ligaments, cartilage, or other semirigid structures are well protected from injury because of the rigid support about them. The noncollapsible character of the tissue about such vessels may, however, delay hemostasis when the rigid channel through which the vessels run is destroyed.

The resistance offered by the tissues of the body to forcible distention varies, of course, with the type of tissue. This resistance is known to oppose the loss of fluid from vessels, and it also influences the escape of blood from them. The tissues of certain organs, like the brain, offer little resistance to blood extravasations. Whenever loose areolar tissue surrounds a vessel, it affords little resistance to extravasated blood. Scleroderma is just the opposite.

The content of thromboplastic substances in the tissues may conceivably have some influence on the rapidity of the clotting of blood escaped from the vessels. Anticoagulant materials are also found in the tissues in varying concentration and potency, apparently side by side with thromboplastic substances. Tissue autolysis will often destroy the clot accelerating substances.

VASCULAR FACTORS

Structure of the vessel. This is principally related to the essential difference between arteries and veins as to elasticity and muscular tissue, as well as to their relative sizes and the pressure within. The state of relaxation or spasm as a related factor in severance is of the greatest importance.

INTRAVASCULAR FACTORS

The hemostatic plug. This plug may consist of platelets alone, fibrin, white cells, red cells, or all in combination. Arrest of bleeding depends in a large measure on the formation of this plug by elements

from the blood itself. Formation of the plug may be separated into three phases, each of which may occur independent of the other or fail to appear altogether. These phases are: (1) platelet massing, (2) deposition of fibrin, and (3) contraction and hardening of the platelet/fibrin plug. Platelets from the blood are attracted to the damaged zone, come together, and adhere to, and form a layer over, the area. This is probably the simplest form of reaction of the blood to an injury of the vessel wall. It may be the only form of reaction to injury in small vessels when the blood pressure and volume are relatively low and the vessel walls thin and collapsible. When the platelets come together they may swell, burst, and liberate substances with clot accelerating properties. A thin fibrin film may then be deposited at the point of contact between the platelet mass and the overlying blood. Other platelets then adhere to the film and form clumps. Platelet massing requires that there be an adequate supply of platelets with the proper degree of agglutination ability and capacity for adhesion. The number of platelets in the peripheral circulation depends somewhat on the rate of production, the rate of utilization or destruction, and their distribution in the body. The platelets originate from megakaryocytes found principally in the bone marrow. The normal rate of production is probably 100,000 platelets per cubic centimeter of blood per day. This is accelerated after hemorrhage.

Platelet utilization and destruction are intimately linked, since when the platelet is used it is nearly always destroyed. Generally the utilization of platelets increases whenever the body is exposed to excessive stresses. The reverse takes place when the illness is over. The distribution of platelets is not uniform throughout the vessels, and more are found in the arterial than in the venous blood of the extremities.

In vessels in which the pressure or volume of blood is high, much of the effectiveness of the hemostatic mechanism depends on the rapidity with which the fibrin clot will form and the promptness with which the clot will become dense, adhere to the vessel wall, and retract itself.

Fluidity and coagulability of the blood are antagonistic to one another. It is by keeping a balance between the fluidity inducing (anticoagulant) and coagulation promoting (coagulant) factors, that the blood maintains itself as a circulating medium.These factors are well known. The changes that occur in the blood after it is shed and brought into contact with foreign surfaces present three phases:

First phase: release of cephalin, and reduction and eventual loss of the natural anticephalin activity of the blood when it comes in contact with the released cephalin or the damaged surface of the vessel. The normal slowly reacting prothrombin is made highly vulnerable to the action of cephalin. There is no particular order of these steps.

Second phase: transformation of prothrombin to thrombin. This depends on the amount of cephalin available and the extent of the anticephalin activity.

Third phase: Action of the thrombin on the fibrinogen with the production of fibrin. The clot is eventually liquefied by the action of fibrinolysin.

As long as the contacting surface of the interior of the blood vessel (endothelium) is intact, the stability of circulating blood will be unaltered. When the surface is damaged, the stability is threatened by the presence of cephalin rich tissue juices which help to neutralize the blood anticephalin activity and to accelerate the conversion of prothrombin to thrombin, and the changes in the physical properties of the surface in contact with the blood. The damaged surface helps to remove anticephalin from the blood and aids in the disintegration of platelets and leucocytes, with the consequent release of more cephalin from the platelets.

The term cephalin serves to designate the lipid or group of lipids with clot accelerating properties which form the active component of thromboplastic tissue and platelet extracts. It is found especially in the brain, lung, heart, and testicle. In the blood itself, it is found chiefly in the platelets and leucocytes On disintegration, platelets release cephalin; this is thereby dispersed through the blood and initiates the changes in the immediately neighboring areas which eventually lead to the formation of thrombin. The number in the blood is about 40 times that required to accelerate the coagulation of normal blood. Platelet disintegration, however, is the important factor. The two most important factors that influence platelet disintegration are the coagulability of the plasma in which the platelets are suspended and the extent of contact with surfaces favoring their disintegration.

When suspensions of human cephalin or cephalin containing substances are incubated with normal human plasma in plastic or collodion coated tubes, their clot accelerating power is greatly reduced. This property is termed anticephalin activity. Little is known regarding the nature, source, and mode of regulation of this activity.

Prothrombin is a protein with many of the characteristics of the euglobulins, and is probably the clotting factor about which the greatest amount of information is available. The amount of prothrombin ranges between 5 and 10 times the amount required to bring about prompt coagulation of the blood. Other factors being equal, a diminution to about 10 per cent of the normal, or less, is necessary before a significant change is observed in the rate of clotting and the quality of the clots formed. This diminution may result from the increased utilization, as after widespread trauma or long illness, the imperfect synthesis of prothrombin by the liver, improper digestion or absorption of an otherwise inadequate diet, deficient intake of vitamin K, the effect of certain drugs, or from vascular or congenital idiopathic hypoprothrombinemia.

Fibrinogen is the blood protein which, when acted upon by thrombin, is transformed into fibrin. It is principally formed in the liver. From 180 to 400 mgm. per 100 ml. is the normal range.

Fibrinolysin is an agent which brings about dissolution of the fibrin formed during coagulation. It probably exists in the plasma in the form of profibrinolysin and requires activation.

Antithrombin offsets the action of thrombin. The activity appears to reside in the albumin fraction of the plasma or a constituent closely associated with that fraction. The union of thrombin and this albumin constituent leads to the formation of metathrombin, an inert product insofar as clotting is concerned.

In order to be effective, the hemostatic plug must be formed promptly and meet certain requirements. Desirable attributes are adhesiveness, rigidity, and contractility. Generally speaking, the faster the blood will clot, the more rapidly will it develop the desirable physical attributes.

THE DYNAMICS OF HEMOSTASIS

The spontaneous arrest of bleeding nearly always involves two phases which take place regardless of the type of vessel involved:

First phase (vascular). Immediately after blood begins to escape from a vessel, the pressure drops, the vessel walls contract, retract, or collapse, and, if the blood is escaping into the tissues, the surrounding tissue tension increases. The blood is then rerouted through another vessel.

Second phase (hematogenous). The relative slowing of blood flow during the first stage affords it the chance of coming into contact with extravascular tissues or the damaged vessel wall, and precipitates the changes which lead to the plugging of the injured area. The longer the first phase lasts, the greater the chance for these changes to take place.

The order of succession, duration, and magnitude of the changes included in these two phases varies considerably according to the type, caliber, and location of the vessel, or vessels, involved and the volume, pressure, and other properties of the blood within. Arterial blood of the systemic circulation seems to have a higher platelet content than venous blood. This favors the highest level of hemostasis in arterial blood, but is offset by the higher pressure and rate of flow.

Another variable introduced by the changing caliber of the vessels is that the rate of clotting of a given mass of blood varies inversely to the extent of the surface in contact with the blood. Generally speaking, the greater the surface in contact with a given amount of blood, the faster the coagulation. Likewise, the chances for adhesion of the clot are greater if the blood is spread over a large surface. This reaction should be most effective in small vessels.

The structure of the vessel and the pressure of the blood within it determine to a great extent the relative importance of each of the hemostatic factors. In arteries, with blood pressures of from 100 to 120 mm. Hg., and arterioles, from 60 to 70 mm. Hg., the factors, in order, are vascular contraction and retraction, formation of the hemostatic plug, external compression, and platelet massing. In capillaries, with blood pressures from 30 to 40 mm. Hg., and venules, from 10 to 20 mm. Hg., the factors, in order of importance, are external compression, platelet massing, vascular contraction, and formation of the hemostatic plug. In veins, with pressures from 0 to 10 mm. Hg., the factors, in order, are platelet massing, external compression, formation of the hemostatic plug, and vascular contraction.

A few general deductions are:

1. The nature of the defect determines to a large extent what vessels will be affected and these, in turn, determine the location and type of hemorrhagic manifestations.

2. Failure of spontaneous hemostasis may not necessarily follow a deficiency or absence of any one, or even two, of the factors named, provided the existing stresses are moderate and exerted chiefly on vessels not wholly dependent on these factors to check the flow of blood.

3. Most methods of securing hemostasis are attempts to duplicate, in one way or another, the principal steps of the natural mechanism of hemostasis: namely (a) external compression by the use of dressings, packs, distensible bags, and other devices; (b) contraction and retraction of the vascular wall with ligatures, clamps, forceps, or certain drugs like epinephrine; and (c) formation of the hemostatic plug by supplying or aiding the body to produce prothrombin, fibrinogen, platelets, or other constituents that it may lack.

LeRoy J. Kleinsasser, M.D.

SURGICAL TECHNIQUE

OPERATIVE SURGERY AND TECHNIQUE; POSTOPERATIVE TREATMENT

Owens, N.: Implantation of Fascial Strips through the Masseter Muscle for Surgical Correction of Facial Paralysis. *Plast. Reconstr. Surg.*, 1947, 2: 25.

Facial paralysis presents a psychological as well as a physical condition. The imbalance of the facial muscles results in great distortion on any attempt at expression.

Psychologically, inferiority complexes and morose dispositions frequently develop. Injuries to the facial nerve, either accidentally or due to radical surgical procedures, are increasing. Many operative procedures have been attempted to offer relief in these cases. Two fundamental procedures remain—muscle transplants, and support by fascial strips.

The literature is reviewed in detail. The purpose of surgical intervention is twofold: to give support

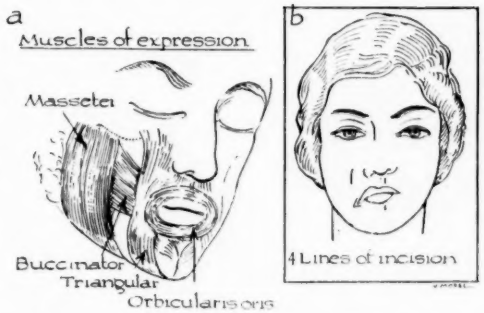


Fig. 1. (Owens) a, Drawing showing some of the important muscles of expression. b, Drawing showing the sites of the 4 skin incisions utilized in this operation.

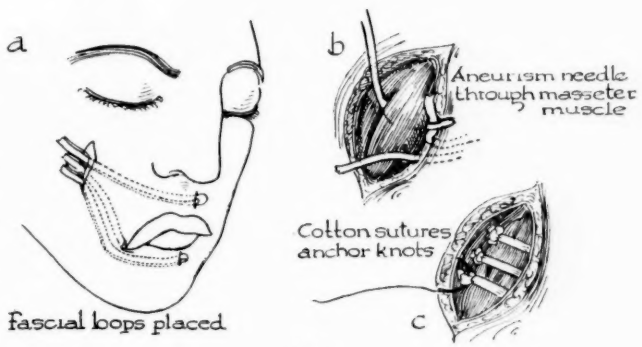


Fig. 2.

Fig. 2. a, Drawing showing the position of the 3 fascial loops after implantation beneath the skin prior to the incorporation of the fascial loops through the anterior half of the masseter muscle. b, Drawing showing the manner in which one end of each fascial loop is passed through the eye of an aneurysm needle which has previously been inserted through the anterior half of the masseter muscle. Subsequent to this the loop is drawn backward and upward so that when it is tied with its fellow the loop is securely anchored around the anterior half of the muscle. c, Drawing showing the placement of the fascial loops after they have been tied securely around the anterior half of the masseter muscle and also the manner in which the knots are securely anchored by re-enforcement sutures of cotton. This latter procedure prevents the fascial knots from becoming loose and subsequently coming untied.

Fig. 3. a, Drawing showing the relative position of the implanted fascial loops after they have been tied around the anterior half of the masseter muscle. Note that all loops have been drawn sufficiently taut before being tied to pull the relaxed tissues upward and backward. b, Drawing showing the relative position of the mouth on the paralyzed side following completion of the operation.

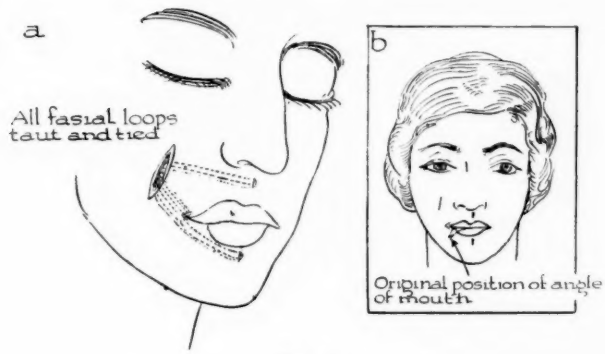


Fig. 3.

to the involved side of the face, and to offer reanimation. To secure these objectives, muscle pull must be associated with the supportive features. The use of the masseter muscle is indicated since it is powerful and close to the paralyzed muscles (Fig. 1).

Fascia lata strips about 25 cm. long and 1 cm. wide are formed into loops. Three loops are used. An incision is made exposing the masseter muscle and this is connected by tunneling with a small incision in the upper lip past the midline on the unaffected side, a small incision in the lower lip past the midline on the unaffected side, and an incision at the corner of the mouth on the affected side. The free ends of each loop are passed from the smaller incisions subcutaneously to the incision over the masseter. Then one free end of each loop is passed through the body of the masseter muscle. The ends of the loop are drawn taut to elevate the lip and angle of the mouth about 1½ cm. The fascial loop is knotted and securely fixed into position by interrupted No. 30 white cotton sutures. The skin wounds are closed. Support to the lip for from 16 to 21 days is given by gauze strips fixed with collodion (Figs. 2 and 3).

A report of 11 operations for facial paralysis is given. The author states: "The operation which offers support and reanimation in cases of facial paralysis by means of fascial strips which connect paralyzed muscles with a functioning masseter muscle is the operation of choice."

EARL H. KLABUNDE, M.D.

Cummine, H.: Postoperative Thrombosis and the Blood Coagulation Times. *Med J. Australia*, 1947, 1: 302.

The author points out that spontaneous intravascular thrombosis may occur not only after operation, when it stands out as a separate entity, but also in diverse medical conditions in which it is frequently masked completely by the primary disorder.

The history of anticoagulant therapy is reviewed beginning with Murray's report on the use of heparin in 1940. Heparin, which appears to be an antiprothrombin and an antithrombin, has an immediate action in prolonging the coagulation time. In the author's hands, the only reliable method of administration was by the intravenous route, with the object of maintaining the coagulation time between 10 and 15 minutes.

Dicoumarol inhibits prothrombin formation by the liver. Its effect may not be apparent for 24 hours, and the dose is regulated by a daily determination of the prothrombin index, the object aimed at being 50%. Its greatest advantage is that it can be administrated orally. Ideal therapy consists in the combination of both anticoagulant drugs.

Early signs and symptoms of thrombosis are rise in the pulse rate and temperature, muscle cramps in the calf, and retrosternal oppression or chest pain. Early postoperative ambulation, bed exercises, and deep breathing are valuable prophylactic measures.

The writer has confirmed the observations of Bergquist of Copenhagen who established the use of the postoperative coagulation graph. Bergquist found that in the cases in which intravascular thrombosis subsequently developed, the coagulation time came down and remained at 3 minutes for a period of hours before the onset of clinical signs or symptoms, and that the intravenous use of heparin at this stage prevented the onset of the condition. The capillary tube method for estimating the coagulation time is recommended.

The blood coagulation time varies from hour to hour and day to day, so that the graph resembles an undulating curve. An isolated reading of 3 minutes or less frequently occurs and is of no significance, but fixing of the reading at this low level is suggestive of developing thrombophlebitis or pulmonary embolism.

The author treated 16 patients with pulmonary embolism, none of whom died. In these cases, heparin was either administered intermittently at 4 hour intervals or introduced through the rubber tubing of a continuous intravenous drip apparatus when required. The coagulation time was kept between 10 and 20 minutes and as near to 15 as possible. It was rarely necessary to administer heparin longer than a few days. There were no instances of toxemia or idiosyncrasy due to heparin.

Active motion, bed movements, and deep breathing exercises were instituted as adjuvants to heparin. Ambulation as early as possible was practiced. Massage was forbidden. Penicillin was given continuously to prevent superadded infection.

Dicoumarol was used in conjunction with heparin in some cases. In 1 case, melena, hematemesis, and wound hemorrhage developed with a prothrombin index of 30 per cent. An index of 50 per cent is probably more satisfactory. The coagulation graph is not affected by the administration of dicoumarol.

Serial electrocardiographic tracings were made in most cases, as it was found that a single tracing was of diagnostic value in only a small percentage of cases. The electrocardiogram may lend valuable confirmatory evidence or may be of no diagnostic value.

Chest skiagrams may reveal an area of pulmonary infarction immediately. Other roentgenologic pictures may reveal frank consolidation, pleurisy with effusion, dilatation of the pulmonary conus, enlarged right heart, and increased hilar shadows. Very often the skiagram offers little help.

No significant changes in the leucocyte count or blood platelet count were noted.

S. LLOYD TEITELMAN, M.D.

ANTISEPTIC SURGERY; TREATMENT OF WOUNDS AND INFECTIONS

Chidichimo, G.: The Spontaneous Evolution of Felons—Treatment with a Closed Method without Intervention (Evoluzione spontanea dei paterecci—Trattamento di essi col metodo chiuso (gesso) con o senza intervento). *Policlinico*, sez. chir., 1947, 54: 19.

In a study of 70 cases of felons and phlegmons of the hand, treated by immobilization for from 8 to 10

days in a plaster cast, by surgical incision and then the application of a cast, or by primary immobilization and then incision, followed by a new application of plaster, the author has noted the beneficial effect of immobilization in all of the cases. A cure of the superficial felons was obtained after 8 or 10 days. In the deep infections the infective process became circumscribed with diminution of pain, and sometimes a spontaneous opening with elimination of a necrotic core or bone sequestra occurred and the fever was dissipated.

Using a similar method of treatment in phlegmon of the hand, the author had no spread of the inflammatory process in the tendon sheath to produce a secondary tenosynovitis. Because no other complications of the immobilized hand, such as ankylosed joints and tendons, atrophy of the bone with pain, and retraction of the palmer aponeurosis were seen, the author advocates this form of treatment.

ARTHUR F. CIPOLLA, M.D.

Blaisdell, P. C.: The Healing Open Pilonidal Wound. *J. Am. M. Ass.*, 1947, 133: 916.

The author points out the confusion existing in pilonidal surgery regarding uncontrolled schemes of primary closure involving special suture materials and patterns, different ways of obliterating dead space and eliminating infection, and prodigious preoperative preparation. Statistical analyses of recurrence rates and healing time are incomplete and susceptible to differences of interpretation and emphasis.

Open pilonidal wounds usually heal in every respect like normal granulating wounds elsewhere. Occasionally they may exhibit varying degrees of delay in healing, independent of whether the wound was left open from the start or broke down following primary suture. Such wounds the writer calls "distressed wounds."

The distressed pilonidal wound is a unique entity with distinct characteristics. The bony surface underlying the pilonidal wound is a convex curve, which curve is continued in the soft parts between the coccyx and anus. A lesion limited to the flat area over the sacrococcygeal joint lacks special problems, but extension into the intergluteal cleft has many untoward features.

The most common cause of delayed healing and recurrence is incomplete operative removal of the lesion, and is unrelated to any unique characteristics of the pilonidal wound itself. Incomplete removal is far more common than is realized. The pathologic report can be helpful in warning of missing portions, and the error may then sometimes be rectified in postoperative office care, but this is impossible in a sutured wound.

The chief untoward characteristic of the open pilonidal wound and the next most common source of recurrence is the tendency of both granulation tissue and skin to bridge across. This leaves a readily overlooked underlying channel which becomes a permanent sinus unless prevented or destroyed.

Clinically, recurrence in the open wound is permanent delayed healing. In contrast, recurrences following suture are apt to occur long after apparently satisfactory healing. This is a great source of error in the comparative statistics of recurrence following open and closed methods.

Bridging is undeniably related somehow to infection, yet the control of bridging in the open wound is not dependent on the control of infection. Infection would be impotent were it not for the force of contraction on the uniting tissues in the cleft. The conversion of wounds with steep sides to shallow forms for the prevention of bridging is called "saucerization," and the tendency to bridging varies inversely with the degree of saucerization obtained. Saucerization is urgently needed in the intergluteal cleft, yet desirable saucerization there would involve preposterous loss of the buttock. Thus, meticulous postoperative diligence is necessary.

Undermined skin edges at the ends of distressed pilonidal wounds is a cardinal indication of trouble. To prevent it, gradual slopes of the longitudinal ends of the wound should always be obtained. All that is necessary is a simple linear incision at both ends.

If one is confronted by an overhanging skin edge, the wound should be explored and restored under anesthesia. Retained sinus remnants and deep bridging should be disposed of. Excessive granulation is an effect rather than a cause of delayed healing, it always accompanies a retained sinus, postoperative bridging, and overhanging ends, and recedes as they are counteracted. Excessive granulations also occur with the rubbing together of the opposing surfaces of the wound. This can be treated by applying flamed adhesive to the raw wound surfaces.

Infection is not a problem of the open pilonidal wound, but frequently causes sutured wounds to break down.

In the discussion, ROSSER suggested that during the early days of healing the broad open wound should be protected from bacterial contamination and any avoidable physical injury. TUCKER pointed out the similarity between principles of pilonidal surgery and fistula surgery. MCGUIRE argued for the closed method, citing the added morbidity of the open method. BLAISDELL, in closing, emphasized that the recurrence rate after the closed operation was 20 times that after the open method.

S. LLOYD TEITELMAN, M.D.

Rountree, P. M.: Cross-Infection of Wounds in a Surgical Ward during a Trial of the Use of Oiled Blankets. *Med. J. Australia*, 1947, 1: 427.

A previous investigation by the author (and Armytage) in 1946, revealed the large bacterial load carried by hospital blankets. The use of oiled blankets in a general surgical ward was studied in order to determine whether such blankets would have any effect on the incidence of wound cross-infection.

The blankets were collected, marked distinctively, laundered, and oiled before the commencement of the trial. One hundred and eight blankets were

used; this number was considered likely to be sufficient for the duration of the experiment. The blankets were washed in the hospital laundry in the usual way in three batches of 36 blankets each, and after the final rinse were oiled with a "fixanol C" oil and water emulsion. This emulsion consisted of the following components: water, 60 pounds; white oil, 15 pounds; "fixanol C," 6 pounds. Twenty-four pounds of this emulsion mixed with water to give a 1 in 10 dilution were used for each load of 36 blankets. The average oil content on drying was 5 per cent and the concentration of "fixanol" was calculated to be approximately 1 in 800. The treated blankets remained in continuous use during the 4 months' period of the trial. Since the number of blankets on any one bed is often altered, it was not practicable to arrange for the exclusive use of a set of blankets for each individual bed. All oiled blankets therefore came out of, and were returned to, the common pool as the occasion required.

At the conclusion of the trial samples were taken from unused oiled blankets stored in the linen cupboard, from oiled blankets on 10 different beds in the male ward, and from unoiled blankets on 10 different beds in the female ward. The unoiled blankets may or may not have been in use as long as the oiled blankets, but serve as a typical sample of the normal hospital blankets. These samples were examined for their total numbers of bacteria per gram of blanket and for the presence of hemolytic streptococci.

Swabs were taken from the wounds of all patients the day before the commencement of the trial and thereafter at intervals of 1 week during the course of the test. In a few cases, more than a week elapsed between operation and the first removal of the dressing. In such cases the wound was swabbed when the dressing was removed. The swabs were plated on blood agar and incubated aerobically. Organisms isolated were identified as completely as possible. Hemolytic streptococci were grouped but not typed. All staphylococci were examined for coagulase production and, as far as possible with the range of phages available, for phage type according to the method of Wilson and Atkinson (1945).

During the trial the ward dust was examined for the presence of hemolytic streptococci and coagulase-positive staphylococci. Bacterial counts were also taken of the air in the male ward during bed making and sweeping.

Air samples taken in the male ward during bed making supplied confirmatory evidence of the value of the oiling process in reducing the bacterial load in the blankets and so, indirectly, in the air. A count of 134 organisms per cubic foot of air was obtained under conditions similar to those which had previously given a count of 636; however, as soon as sweeping commenced in the ward the count rose to 634 organisms per cubic foot of air.

The wounds examined included all types of general surgical wounds. The majority were in such positions that they could be considered "clean" surgical wounds; but a number of cases included such conditions as chronic empyema sinuses, varicose ulcer, third degree burns, excisions of fistula in ano, and pilonidal sinus. Such wounds were classified as "dirty" wounds.

In the cases of "clean" wounds, cross-infection was considered to have occurred if the first swab, taken a week after operation, yielded a culture of micro-organisms, if a culture followed a previously unsuccessful attempt at obtaining a culture, or if another type of organism appeared in a wound already yielding bacteria.

In the case of the "dirty" wounds, the criterion of cross-infection was the appearance in the wounds of another type of organism. In 3 cases, infection was apparent at the first removal of the dressing after operation, and may reasonably be assumed to have occurred in the operating theater. In the remaining cases the infections are assumed to have taken place in the ward, and in many of these there is conclusive evidence that this is what had actually occurred.

The most frequently occurring organism was the staphylococcus, and if coagulase production is taken as a criterion of pathogenicity, pathogenic staphylococci were recovered from 18 wounds in the series. There were only 3 cases of infection with group A hemolytic streptococci. In general, the other organisms isolated cannot be considered wound pathogens; but their isolation from surgical wounds can be taken as an index of the presence of conditions which permit the transference to such wounds of bacteria, including potential pathogens.

Nose and throat swabs were taken from the nursing staff of the ward. Coagulase-positive staphylococci were isolated from 5 of 14 nose swabs and from 1 of 14 throat swabs. These were typed and it was found that two of the nurses were nasal carriers of the type 2b organism. The noses of these nurses were swabbed at weekly intervals in the following weeks and they were found to be persistent nasal carriers of this type. A point which seems of considerable importance in elucidating the origin of the cases of wound crossinfection with this type is the fact that these two nurses were senior nurses who were responsible for the dressing of the wounds of the patients.

The fact that 3 of the patients infected with this organism were also found to be nasal carriers may possibly indicate that the infection in these cases was autogenous. On the other hand, other infected patients did not carry the organism in their noses and it seems more likely that the nasal strains were implanted during the patients' stay in the ward. A further point which supports this presumption is the fact that all type 2b strains isolated in the ward were penicillin resistant.

The efficacy of the "fixanol" and oil treatment in reducing the bacterial load of blankets is illustrated by the bacterial counts obtained with the blankets used in this investigation. In reports by the Commission on Acute Respiratory Diseases and the Commission on Air-Borne Infections (1946), it is stated that oiling of blankets reduced the numbers of bac-

teria released by 90 to 95 per cent. It would appear that treatment with "fixanol" and oil not only reduced the numbers of bacteria releasable from the blankets, but also resulted in the actual destruction of a large proportion of the micro-organisms deposited on the blankets in the secretions of the patient. However, it is apparent from the incidence of wound cross-infection during the trial that oiled blankets used alone and without other dust control measures had no effect on the control of cross-infection under the conditions obtaining in the ward during the investigation. This investigation has once more emphasized the complexity of the problem of cross-infection of surgical wounds. The evidence available suggests that in this trial infective particles from the blankets played little part in the production of cross-infection. The role of dust infected from other sources—for example, from the bed linen, or directly from the skin and nasopharynx of patients—is difficult to assess. It appears that some of the nursing staff, directly or indirectly, may have been responsible for a proportion of the staphylococcal infections. BENJAMIN GOLDMAN, M.D.

Silverthorne, N.: Tetanus. *J. Pediat.*, S. Louis, 1947, 30: 195.

This is a study of 70 pediatric patients afflicted with tetanus during the years 1921 to 1946, and represents a summary of the clinical observations, treatment, epidemiology, and prognostic indications. Most of the cases occurred during July, August, and September. The majority of the patients were between the ages of 3 and 13 years; there were 53 males and 17 females. Some type of trauma could be recalled in most instances, but in 15 of the 70 there was no history of cut, scratch, or puncture wound. The incubation time varied from 1 day to 1 month, and it was observed that the shorter this period was, the more seriously ill the patient. Of greater significance was the length of the invasion stage: the shorter this period, the more likely the patient was to succumb. Active immunization for children is urged.

Proper treatment should consist of: quiet in a darkened room with constant nursing attention; intravenous fluids when oral feedings are contraindicated; prompt intramuscular administration of antitoxin in doses varying from 40,000 to 300,000 units, according to the severity of the disease; penicillin when necessary for secondary infections; sedation, the author preferring seconal; and cleansing of the wound, but not excision as several patients became worse following this procedure.

A general fatality rate of 47 per cent was found. For the last 10 years alone, the fatality was 28 per cent. This improvement is attributed to better principles of treatment, especially the route of antitoxin administration. The author recommends that tetanus antitoxin be given intramuscularly and advises against its intravenous or intrathecal use. Evidence suggests that in recent years this disease has become considerably less severe.

C. FREDERICK KITTLE, M.D.

Cozar, B. S.: Generalized Tetanus without Trismus (Tétanos generalizado sin trismus). *Rev. españ. cir.*, 1946, 5: 141.

A case history is given of a laborer who injured his right hand slightly while standing in a cultivated field. Infection set in and the area was lanced, but the process progressed and the day following the incision the patient was observed to have difficulty in swallowing and opening his mouth; there was also a slight trismus. These symptoms lasted only a day. Several days later generalized symptoms appeared. Convulsions set in as well as generalized tetanus, which was typical and complete in every respect except for evidence of trismus.

Trismus is considered a cardinal symptom of tetanus and the author has no satisfactory explanation of the phenomenon observed in his patient.

The different theories regarding the manner in which the tetanus toxin is absorbed and its mode of action are discussed at length.

STEPHEN A. ZIEMAN, M.D.

Long, A. P., and Sartwell, P. E.: Tetanus in the United States Army in World War II. *Bull. U.S. Army M. Dep.* 1947, 7: 371.

In the army, prior to 1941, tetanus prophylaxis consisted of antitoxin administration to all men whose injuries seemed to warrant it. The major drawbacks of this measure are that (1) it may not always be possible to provide the prophylactic injection of antitoxin, and (2) there is a hazard of hypersensitivity reaction.

Since 1941, plain or fluid tetanus toxoid has been used as the immunizing agent for the prevention of tetanus. This type rather than the alum precipitated toxoid was chosen because the British and French demonstrated its efficacy and safety, and its sensitizing properties were less.

The administration of toxoid was based on the principle of establishing a basic immunity and reinforcing it by stimulating injections of the toxoid. All military personnel were given a basic immunization of three subcutaneous injections of 1 c.c. of tetanus toxoid at intervals of 3 weeks. Routinely at yearly intervals, 1 c.c. of a toxoid stimulating dose was given, and emergency stimulating doses of 1 c.c. of toxoid were given when wounds or other injuries likely to lead to tetanus were incurred, or upon manipulation of old wounds considered to be potentially contaminated by Clostridium tetani.

Studies were carried out by measuring circulating antitoxin levels after the administration of tetanus toxoid. It was shown that immediately after the initial series adequate protection existed, and there was no need for prophylactic antitoxin. Additional studies were carried out to determine how long basic immunity (sufficient to allow for an adequate response to a stimulating dose) will persist. Adequate response to a booster dose of toxoid was observed for a period of at least 3 years after the basic immunization and 2 years after the routine stimulating dose. It is suggested that this protection probably con-

tinues for a considerably longer period. However, it still would appear wise to continue the administration of emergency stimulating doses of toxoid following injury, and it appears that the adequate response develops well within the usual incubation period of tetanus.

Reactions to toxoid are few, and may be of two types. The first, nonspecific in nature, may result in local soreness at the injection site, headaches, general malaise, and occasionally chills and fever. The second type is characterized by the early appearance (within 30 minutes after injection) of flushing, itching of the skin, urticarial eruptions, and occasionally edema of the lips, eyelids, or glottis. It is believed that reactions of this type were due to hypersensitivity to a previous dose. Following discontinuance of the use of certain toxoids with peptone components, reactions dropped to less than 2 per 100,000 injections. Initial sensitization with the materials in current use appears to be almost nonexistent.

During World War II, 12 cases of tetanus occurred among Army personnel, including 4 cases resulting from injuries sustained prior to entry into active service. Only 1 case of tetanus resulted from a battle injury; the other cases resulted from accidents. Penetrating injuries of the extremities were the most common cause. Six of the 12 patients had received no immunization at all, 2 had had basic immunization but no emergency stimulating injection, and 4 had had basic stimulation plus an emergency stimulating injection. There were 5 fatalities in this group, and the incubation period in the fatal cases was slightly less than 7 days.

During World War I the Army reported 13.4 cases of tetanus per 100,000 wounds and injuries. During the period from 1920 to 1941 there were 2.4 cases per 100,000, and during World War II, 0.44 case per 100,000, a drop in frequency to 1/30 that for World War I.

From a study of the incidence of tetanus in the enemy forces, and among civilians injured in military operations, it is evident that without the benefit of toxoid a considerable number of cases of tetanus might well have occurred in our troops. By avoiding prophylactic antitoxin, a considerable number of serious serum reactions were prevented.

The average mortality rate among American civilians from 1936 to 1938 for all age groups was 0.76 per 100,000 population per year. There has been a steady decline in tetanus mortality over many years, probably as the result of better surgery and an increased use of antitoxin. In the authors' opinion it is doubtful whether toxoid is in use on a sufficiently wide scale to have any great effect on civilian mortality.

During the war, the British reported 35 cases of tetanus due to battle injury among 289,649 wounded men. In addition, they found 18 cases in troops who had sustained nonbattle injuries. Boyd noted that the incubation period was shorter in the actively immunized personnel who developed tetanus, and an inadequate level of circulating antitoxin in the early stages of infection was the cause of failure of immunization in these cases.

War experience proves the efficiency of this Army procedure for the prevention of tetanus. Reliance was not placed on a continuing state of immunity following immunization, but rather advantage was taken of the rapid rise in blood antitoxin levels which occurs soon after the administration of a stimulating dose.

Active immunization should be carried out in civilian practice, particularly in the cases of children and adults whose activities are such that infection with Clostridium tetani may be seen. Such individuals should be furnished with a record of the procedure so that physicians subsequently treating their injuries may know that the administration of toxoid, and not antitoxin, is the prophylactic treatment of choice.

The alum precipitated toxoid lends itself to use in children in combination with other antigens such as diphtheria toxoid. Fluid toxoid, because of its more rapid absorption, may be the agent of choice for the booster dose.

In the case of an ex-serviceman stating that he was in the Army for at least a year subsequent to Pearl Harbor, it would be reasonably safe to administer toxoid rather than antitoxin prophylactically. Such military service would almost certainly mean he had at least received his basic tetanus immunization; hence, he could be expected to respond satisfactorily to a stimulating dose of toxoid.

ROBERT R. BIGELOW, M.D.

Sovena, A.: Chronic Meningomyelitis following Intraspinal Tetanus Antitoxin Therapy for Tetanus (Contributo allo studio delle complicanze nervose post-sieriche nel tetano. Meningomielite a decorso cronico insorta dopo sieroterapia endorachidea antitetanica). *Policlinico*, sez. prat., 1947, 54: 218.

A patient was cured of tetanus following the administration of tetanus antitoxin by means of the intraspinal and intramuscular routes. One month later she developed a spastic paralysis, with disturbance of sensation and loss of sphincter control. Characteristic myelographic studies showed an obstruction in the ninth dorsal vertebra.

A laminectomy was performed from the 4th to the 7th thoracic vertebra, which revealed a plastic leptomeningitis, attached tenaciously to the spinal cord. This produced a transitory amelioration of the symptoms, which recurred when a second laminectomy was done on the last thoracic and the first lumbar vertebrae. Vascularized chronic adhesions were found. The patient's condition became worse; a high fever was present, and finally death occurred, approximately 3½ months following the onset of the condition.

The author concludes that the chronic meningomyelitis was due either to the tetanus toxin or to an antiphylactic reaction to the tetanus antitoxin.

ARTHUR F. CIPOLLA, M.D.

ANESTHESIA

Hellijas, C. S., Tovell, R. M., and Holt, K. R.: Analgesia and Anesthesia in Obstetrics. *Anesthesiology*, 1947, 8: 113.

The application, with the greatest safety, of any agent or method to the production of obstetric amnesia, analgesia, and anesthesia requires proper evaluation of the status of the prospective mother in the antenatal period, close co-operation of the obstetrician and anesthetist, and a degree of flexibility of plan of action which will permit alterations of procedure when required.

The opiates have, to a great extent, been replaced by less depressant drugs, the most popular of which are demerol and selected derivatives of barbituric acid. Scopolamine has been the adjuvant of choice in most of the combinations of agents recently employed. Two preparations administered by the rectal route are still extensively employed. Mixtures of ether and oil, or ether, paraldehyde, and oil in conjunction with pentobarbital sodium have been advocated, as has a combination of paraldehyde and benzyl alcohol. The barbiturate series has received a modest trial by the rectal route, either as the sole agent or as an addition to rectal anesthetic mixtures. Nembutal and seconal, dispensed in capsules, act promptly following administration in this manner.

The efficacy of cyclopropane has been demonstrated; it has steadily replaced the more common anesthetics given by inhalation. Local, regional, and spinal anesthesias are advocated by a relatively small number of proponents. The employment of continuous caudal analgesia has served to demonstrate its usefulness in selected cases. The failure of its general applicability to obstetric practice has become evident.

At the present time at the Hartford Hospital, Hartford, Connecticut, amnesia and analgesia are most often produced by the use of a combination of nembutal, seconal, or sodium amytal with scopolamine. The combination of demerol and scopolamine has proved as satisfactory as the barbiturate-scopolamine medication. Continuous caudal analgesia for relief of pain during labor and for eventual delivery was employed in relatively few cases.

Since 1936, the most prominent developments have been the marked increase in employment of cyclopropane for obstetric purposes and the growing popularity of spinal anesthesia for the performance of cesarean sections. In 1945, 83 per cent of cesarean sections were performed with spinal anesthesia as the basic method of choice, and cyclopropane was used as the sole agent in more than 95 per cent of the cases in which an inhalation anesthetic was administered.

The increased employment of the agents for amnesia, analgesia, and anesthesia now in active use in this hospital has contributed in a most creditable manner to a decrease in fetal mortality and maternal morbidity. Two other factors must be presented to realize a true perspective of the overall decrease in fetal and maternal mortality. These are the greater incidences of cesarean sections and forceps deliveries.

MARY FRANCES POE, M.D.

Green, H. N., Harbord, R. P., and Others: Discussion; Shock with Special Reference to Anesthesia. *Proc. R. Soc. M., Lond.*, 1947, 40: 167.

In the present discussion, Green stated that between general anesthesia and shock there are superficial resemblances. Observation of the anesthetic state seen in advanced adenosine triphosphate shock led the author to consider a possible relationship between the two states. Though it is not known in what way anesthesia and shock are precisely related, the view that they are supplementary rather than complementary states seems plausible.

It does not follow that, because the shocked individual requires less anesthetic, anesthesia necessarily predisposes to shock and, in fact, it would seem that the reverse hypothesis has points in its favor. It must be concluded that afferent nerve impulses do play some part in the complicated genesis of shock and therefore that local and regional anesthesia have some place in shock prophylaxis. Every manifestation of shock has as its outcome the conservation of body energy and fluid. Provided that the secondary toxic effects are avoided, it may well be that anesthesia may actually be beneficial in reinforcing a general defense mechanism to injury. This does not mean that clinical shock is a desirable state, but, up to a certain point, shock must be a beneficent reaction. We have no accurate measure of the safety limit.

Clinical shock is the expression of large-scale tissue injury and the treatment is solely that of restoring the injured parts to normal. In the final analysis anesthesia is the most potent weapon that we have in the prophylaxis of shock, for with it damaged tissue can be removed or restored, which would often otherwise remain to kill.

The anesthetist ought to become the recognized expert in clinical shock. He has the best facilities for assessing the degree of shock and he is most directly concerned with the degree of tissue oxidation.

Harbord stated that the present confusion of thought regarding the best anesthetic for shock is because of the lumping together of various illnesses under the term "shock." This paper is based on a study of the responses of a standard type of patient under similar conditions, and covers a part of the material collected by No. 1 Traumatic Shock Research Team during the war.

In limb injuries, the illness of the patient depends mainly upon hemorrhage. The signs found at operation depended on blood loss, which in general was dependent upon the amount of damaged tissue remaining adherent to the body. In belly injuries, the same was true but to a lesser extent. Other factors caused an alteration in the signs at operation. Pressor and depressor responses were observed in both limb and belly cases.

The evidence shows that there is often a pressor effect at operation which is due to the anesthetic.

It was most probably due to a change in the carbon dioxide stimulus. The significance is that a false interpretation is obtained concerning the state of the patient; the pressor effect may reflect an additional circulatory strain, and the period immediately following the removal of the mask is potentially dangerous. Other effects of anesthesia depended upon the drug employed.

With ether and cyclopropane, a well marked vasodilatation occurred, while with pentothal anesthesia little alteration was observed. Since it is a change imposed upon the patient by anesthesia, it may in fact be an adverse effect. It was found that the doses of anesthetic drugs in these patients were what would have been expected in normal patients undergoing similar operations. It appeared that the skill in administration was more important than the choice of anesthetic when comparisons were made between pentothal, ether, or cyclopropane.

MARY FRANCES POE, M.D.

Wikle, H. T., and Ryan, R. J.: Convulsions Occurring under Anesthesia. Analysis of 6 Cases. *Am. J. Surg.*, 1947, 73: 83.

Convulsions during anesthesia are rather uncommon but it is important for physicians to be on the alert to treat these convulsions, and to prevent their occurrence if possible. Convulsions during anesthesia were encountered 6 times in one year during which 2,142 anesthetics were administered on the surgical service of the Cumberland Hospital, Brooklyn, New York.

The etiology is extremely vague. The literature is replete with reports of possible causes, many of which contradict each other, thereby making the situation more confusing.

Despite lack of knowledge concerning the causative factors, strict attention should be given to the preoperative care of patients, particularly those who are acutely ill and toxic, in an effort to lessen the number of convulsions during anesthesia. The reported incidence of convulsions associated with spinal anesthesia is negligible compared to that with inhalation anesthetics. It is worth while to consider the use of spinal anesthesia in these toxic patients.

The authors recommend the prompt use of sodium pentothal as advocated by Lundy. Heretofore, the mortality in patients having convulsions during anesthesia was extremely high. With sodium pentothal at hand, this figure should be lower. There was only one death among the six patients herein presented and this was attributable, not to the convulsion but to hepatorenal failure on the fifth postoperative day.

MARY FRANCES POE, M.D.

PHYSICOCHEMICAL METHODS IN SURGERY

ROENTGENOLOGY

Hunt, H. B.: Cancer of the Eyelid Treated by Radiation; with Consideration of Irradiation Cataract. *Am. J. Roentg.*, 1947, 57: 160.

The author presents a survey of cancer of the eyelid, based on 100 cases selected from a group of 134 cases. The distribution of cancer of the eyelid according to sex shows a somewhat higher incidence in men—66 men to 34 women.

Cancer of the eyelid usually begins first as a small nodular thickening or elevation located directly adjacent to the lid margin. The lesion enlarges and extends very slowly, as a rule.

The cancer lesion shows a predilection for the medial portion of the lower lid and the area about the inner canthus, about four-fifths of the lesions occurring in this combined area. In the present series, 48 per cent of the lesions occurred along the lower lid and 34 per cent about the inner canthus, with only 6 per cent along the upper lid and 12 per cent adjacent to the outer canthus.

Carcinoma of the eyelid extends primarily by direct infiltration. Basal cell carcinoma may extend subcutaneously or may permeate locally along adjacent lymphatics. Advancing carcinoma of the eyelid may travel through the lymphatics, penetrate the orbital fascia, and give rise to intraorbital metastases. Lesions about the inner canthus tend to invade the lacrimal duct. Inner canthal lesions may spread across the base of the nose to the opposite inner canthus. Squamous cell carcinoma of the eyelid, although not common, is a more serious lesion, shows greater local invasion, and frequently metastasizes to the parotid or submaxillary glands.

The problem of postirradiation cataract is of paramount importance to the radiologist in the treatment of carcinoma of the eyelid by roentgen rays or radium.

The author has found an eyeshield, developed by Wölfflin, to be satisfactory. It is composed of lead, 1.2 mm. in thickness, and is plated with nickel for absorption of the characteristic radiation of the lead. This shield, however, is not satisfactory for gamma irradiation.

The treatment applied in this series of 100 cases varied in type and combination according to the individual problem, and according to our maturity of experience at the time. Roentgen therapy was employed in 92 cases, radium therapy in 11 cases, and electrosurgical procedures in 12 cases. Further analysis shows that roentgen therapy alone was employed in 80 cases, radium alone in 3 cases, radium and roentgen rays combined in 5 cases, electrosurgery and roentgen rays in 7 cases, electrosurgery and radium in 3 cases, and electrosurgery alone in 2 cases.

Roentgen therapy has now become the author's radiotherapeutic method of choice due to its proved effectiveness, accuracy, simplicity, and restriction of exposure more closely to the diseased area. Fractionation of treatments is advantageous in lesions of over 3 or 4 mm. in thickness in roentgen therapy. Roentgen radiation energized by 70 kilovolts (peak) is used for small and superficial lesions. In lesions over 3 or 4 mm. in thickness, radiation energized by 90 kilovolts (peak) is used, while lesions infiltrating the lid are treated by 130 kilovolts (peak) of radiation, using a filter of 0.25 mm. of copper and 1 mm. of aluminum. Deep infiltrations of the orbit are treated by 200 kilovolts (peak), using 0.5 mm. of copper or Thoreus filter. Surgical ablation of large elevated carcinomas of the eyelid prior to roentgen therapy permits more effective radiation.

Four of the 100 patients whose cases are reviewed have died from cancer of the eyelid during the past 15 years. Therapeutic failures result from (a) advanced and inaccessible disease; (b) impairment of the tumor bed by prior inadequate therapy; (c) insufficient or uneven dosage; (d) incomplete marginal coverage of the lesion, and (4) inadequate follow-up of patients. In general, superficial roentgen therapy is very effective in the eradication of cancer of the eyelid with maximal preservation of the uninvolved tissues and with minimal injury to the eye when properly protected by an eyeshield.

FRANK L. HUSSEY, M.D.

Windholz, F.: Reactions of Connective Tissues after Protracted Fractionated Irradiation of Laryngeal Carcinoma. *Radiology*, 1947, 48: 148.

The author is chiefly concerned with connective tissue reactions as they occur after protracted fractionated irradiation. The studies were made on structures of the larynx which were irradiated because of the presence of carcinoma. In the present study, the microscopic findings observed in from 1 month to 10 months after protracted fractionated irradiation are described in detail and interpreted. Numerous photomicrographs are used in the text to illustrate the various points of interest.

The studies show that, contrary to former belief, there are profound and extensive early and late changes in the connective tissue after protracted fractionated irradiation of the larynx. These changes occur in three stages.

The first stage corresponds to a bionegative retrogressive period which coincides with fibrinous radiomucositis and disintegration of the epithelial cells of the mucous membrane. In this stage the most important manifestations are the exudation of fibrin, a partial or complete loss of nuclear staining, and the frequent modifications in the microchemical reaction of the subepithelial collagenous fibers.

The second stage is characterized by a biopositive regenerative activity. Connective tissue replaces the destroyed carcinoma. The fibrinoid necrosis leads

to a regenerated connective tissue with hyaline sclerotic layers throughout the area of irradiation. This is associated with diffuse atrophy of the mucosa, laryngeal glands, fat tissue, and even muscles. The blood vessels are often obliterated, and the remarkable thing is that veins are more profoundly affected than arteries. The inflammatory reactions of the regenerated connective tissue are greatly reduced.

A third, retrogressive, stage is observed in those instances in which the irradiation was too heavy or in which the individual sensitivity of the connective tissue is higher than average. In such cases the mucosa ulcerates, the newly formed connective tissue breaks down, and secondary infection follows, with deep necrosis of the irradiated larynx.

It is the author's contention that the advantage of the protracted fractionated irradiation, as compared to the massive irradiation given in a short time, is the fact that retrogressive and regenerative processes develop under the influence of a prolonged flow of the radiant energy. It is assumed that the loose normal connective tissue is transformed into a hyaline sclerotic connective tissue, with few cells and sparse blood vessels, which is more resistant to the irradiation and consequently will tolerate a larger total dose without disintegration.

This new connective tissue also influences the general nutritive condition of the larynx, mainly in the areas near the lumen. The perichondrium, which has a selective radiosensitivity because of its closed blood supply system, may be particularly affected and result in perichondritis and edema.

T. Leucutia, M.D.

Windholz, F.: Late Changes in Mucous Membrane of the Irradiated Larynx. *Radiology*, 1947, 48: 274.

In his second article, the author deals mainly with the changes occurring in the epithelium of the larynx following protracted fractionated irradiation. The studies are based on microscopic examinations of the mucous membrane of the larynx, made in from 1 month to 10 months after irradiation for carcinoma. The average tissue dose was 5,800 roentgens, and the treatment was administered with 200 kilovolts, Thoraeus filter, 8.1 roentgen min., and 6 by 6 centimeter size fields. Again numerous photomicrographs are used for the purpose of illustration.

The studies reveal that the primary effect of irradiation is cell destruction. Coutard observed, as early as 1922, that the epithelium of the larynx is destroyed in approximately 13 to 18 days, and that the mucous membrane has regenerated in 26 days after the first irradiation. In a similar manner the author found that at the time fibrinous reaction occurs, the mucous membrane is entirely destroyed. Remarkably, when regeneration of epithelium takes place, not only the squamous cell epithelium but also the normally high columnar ciliated epithelium is transformed into a fully differentiated epidermoid epithelium exhibiting various degrees of cornification. The author was able to demonstrate the same type of metaplasia experimentally on the irradiated larynx of guinea pigs, which were given a tissue dose of 5,000 roentgens by the protracted fractionated method, during a period of 4 weeks.

The structure of the regenerated epithelium varies according to the postirradiation condition of the subepithelial connective tissues. In areas in which the subepithelial connective tissue shows an advanced hyaline change with marked scar formation, the epithelium is reduced to two to three layers, and has a very atrophic appearance. It is notable that in 2 cases out of 10 in which atrophy of the epithelium coincided with an abundance of hyaline sclerotic connective tissue, the carcinoma disappeared clinically as well as microscopically. In 2 other cases with recurrence of the cancer, the epithelium was very thick and resembled the picture of a precancerous state of the epithelium, and the connective tissue appeared remarkably well preserved.

It is, therefore, the author's conclusion that after the primary epithelicidal reaction subsides the changing generations of the metaplastic epithelium adapt the growth and differentiation properties of their structures to the postirradiation condition of the subepithelial connective tissue.

T. Leucutia, M.D.

Cottoni, F.: Observations on the Deep Cervical Fascia in Man. Contribution to the Study of Retropharyngeal Abscess Secondary to Tuberculous Spondylitis of the First Cervical Vertebrae (Osservazioni anatomo-radiologiche sulla fascia cervicale profonda dell'uomo. Contributo allo studio dell'ascesso retrofaringeo da spondilite tubercolare delle prime vertebre cervicali). *Radiol. med.*, Milano, 1947, 33: 49.

Cottoni reports a case of retropharyngeal abscess due to tuberculous spondylitis of the second cervical vertebra, with anatomical studies performed upon cadavers of varying ages and both sexes for the purpose of explaining why extension in the case reported should have been in the direction of the pharynx rather than toward the posterior mediastinum, as prevailing anatomical concepts would suggest.

He found that the close adherence of the deep cervical fascia anteriorly to the posterior wall of the pharynx, from the base of the skull to the fourth cervical vertebra, and to the body of the third cervical vertebra, along with the insertion of the long muscles of the neck, serves to obstruct the caudad diffusion of abscesses forming in connection with the anterior portions of the first 3 cervical vertebrae and the occipital condyles.

Edith B. Farnsworth, M.D.

Andersen, K., Gammelgaard, A., and De Fine Licht, E.: Hypertrophy of the Pylorus in Adults. *Acta radiol.*, Stockh., 1946, 27: 552.

The authors review the literature on hypertrophy of the pylorus in adults, and present 8 cases found in 16,000 individuals in whom the stomach was examined roentgenologically during the period between

1934 and 1944 at the County Hospital, Gjentofte, Denmark.

The first 2 cases of hypertrophy of the pylorus in adults were reported by Landerer in 1879, and the authors have found 167 cases reported in the literature since then, 71 per cent of them males, the age of recognition ranging from 12 to 80 years. The largest group of cases (81) was reported by Kirklin and Harris of the Mayo Clinic, in 1933; 65 of the patients were males. The ages ranged from 21 to over 60 years of age, rather evenly distributed by decades, the largest number of patients being from 41 to 50 years of age. Preoperative diagnosis was made in only 2 of 169 cases.

The symptomatology is the same as in pyloric stenosis from other causes, vague in mild cases, and consisting of a slight sensation of pressure in the epigastrium after meals, more pronounced in the rarer severe cases with pain and, at times, vomiting after meals. The vomiting usually relieves the pain but the patient begins to lose weight, and in the worst cases cachexia, anemia, and dehydration may ensue. The onset of symptoms is slow, measured in months and years, with a tendency to long intermissions. Hematemesis, melena, or occult bleeding is uncommon but has been found to occur in some cases. Ewald test meal gives normal values. In thin patients a mobile plum-sized mass may be palpable to the right of the spinal column at the level of the second to third lumbar vertebra.

The pathoanatomic change consists in hypertrophy of the circular muscular coat of the prepyloric region extending from the sphincter (but either not, or only slightly, involving it) proximally into the antrum for 3 to 5 cm. This finding is similar to that described in infants with pyloric hypertrophy, and Crymble and Walmslay believe the adult condition to be merely a delayed expression of the infantile condition. Runström, who followed (for years) 107 cases of pyloric hypertrophy in infants, roentgenologically, found that some narrowing of the channel persisted long after clinical manifestations had subsided; he noted that usually not until the age of 4 did slight peristalsis become visible across the involved area, and pointed out that at any time the gastric mucosa became swollen by hyperemia, edema, and inflammatory infiltrate, the relatively narrow canal would be compromised and symptoms would reappear. The authors believe that a similar mechanism probably operates in adults with recurrent symptoms, and the 3 cases they had opportunity to study microscopically showed increased cellular infiltration of the mucosa superimposed on hypertrophy of the musculature of the juxtapyloric region.

On roentgen examination the normal pyloric canal is 0.8 to 1 cm. long, whereas in cases of hypertrophy it measures 2 to 4 or 5 cm., has a smooth funnel-shaped contour, widest orally, is straight if only 2 to 3 cm. long, but, if longer, it is likely to be convex toward the side of the lesser curvature, and tends to invaginate the base of the duodenal bulb. Under close fluoroscopic observation the narrowed canal reveals changes in width and contour, retains its fold pattern in relief view, and in some cases may show, just inferior to its midpoint, a little prominence corresponding to the cleft between the sphincteric and antral musculature, oftenest on the greater curvature, and distinguishable from crater by the readiness with which the contrast material is evacuated.

The authors present 8 cases which fulfilled many or all of the above roentgen criteria. Six of the patients were men. The average age was 60 years, the ages ranging from 53 to 77. Six of the patients had had dyspeptic symptoms for a number of years, 1 had had symptoms for only 3 months, and 1 had no distress. Vomiting had occurred in 4 cases and a positive benzidine reaction was obtained in 2. Six of the patients were operated upon and the 2 others have been under observation for 5 and 9 years, respectively. At fluoroscopy, variation in width of the concentrically constricted and elongated pyloric lumen was seen in each of the cases, barium being propelled through the narrow channel by peristaltic-like contractions, and the authors believe this variation in channel width to be the most reliable sign in differentiating adult hypertrophy of the pylorus from the rigid motionless canal encountered in cases of prepyloric cirrhous carcinoma in which barium flows through in an even stream as through a pipe.

In 5 cases longitudinal rugae were visible in the narrowed portion, but it was recognized that folds may persist for some time in cases of cirrhous carcinoma. Six cases showed the small barium projections referred to above, but these were inconstant in a given patient at different examinations. Six cases revealed a mild grade mushroomlike defect of the bulb base, and a mobile plum-sized mass was palpable in those cases in which the abdominal wall was not unusually thick.

The authors are of the opinion that the differential diagnosis between adult hypertrophic stenosis and juxtapyloric chronic peptic ulcer with flat niche is aided not only by the tendency of the crater to retain barium longer than the small cleft, but also by the frequently eccentric location of the pyloric canal as it is drawn toward the lesser curvature by cicatrix in such old ulcer cases. They believe that when all these points are kept in mind, it is possible to differentiate adult hypertrophic pyloric stenosis roentgenologically from other more serious conditions, in a fair percentage of cases, and thus to avoid exploration unless stenotic phenomena require relief.

LILIAN DONALDSON, M.D.

Pezzini, Z. M.: Radiation Sickness in Patients Undergoing Irradiation Therapy for Cancer of the Uterine Cervix. Clinical Analysis and Study of the Therapeutic Action of Psychergine (Il male da raggi nelle pazienti irradiate per cancro del collo dell'utero. Analisi clinica e studio sull'azione terapeutica della psichergina [1-fenil-2-metilaminopropano clor]). *Fol. gyn.*, Genova, 1946, 41: 373.

During the years from 1931 to 1942 at the gynecological and obstetrical clinic of the University of

Pavia, 247 patients were treated radiologically for cancer of the uterine cervix. This number represents 2.52 per cent of all the patients with gynecological conditions observed during this period. Disturbances of a general character arising during the period of irradiation therapy were noted in 138 of these patients (55.86 per cent); in 105 cases (42.5 per cent) the manifestations were of a trifling character, but in 33 (13.3 per cent) they were severe. The combined method, employing radium internally and roentgen irradiation externally, was used. The radium treatment was given by the continuous irradiation method of Régaud and Lacassagne, 4,800 mgm. hr. through the uterus and the same amount through the vagina. The roentgen treatment was given by the Coutard method, a total of 8,000 roentgens through 4 fields (2 anterior, 2 posterior) at a distance of 50 cm.

In the material studied the predisposition to irradiation sickness seemed to be greater the higher the patient was in the social scale. This the author ascribed to the greater intelligence of this class, both as to the powers of apperception and appreciation. The greatest incidence of the disease occurred during the fifth decade or the period of the menopause; however, the sickness was quite prevalent all during the period of sexual maturity, and the author believes this was due to the greater effect of the endocrine activity on the neurovegetative system during this period, and particularly to the disturbances in the reciprocal physiological mechanisms in the menopause, added to the disturbances following the treatment itself. An odd finding was that the condition of parity did not seem to produce any predisposition to the attacks, nor did concomitant morbidity of the sexual organs have any noticeable effects, except for a seeming increase in the predisposition in the presence of both cancer of the cervix and fibroids of the uterus. As would be expected, however, the tendency toward the attacks increased according to the irradiation sensitivity of the new growth, being greatest in the epithelioma basocellular type of cancer. Also, the length of time during which the tumor growth had been present had an effect, which was probably linked with the greater physical deterioration of the patient in the more advanced stages of the growth. The attacks also seemed to depend upon the amount of diffusion of the cancerous condition. As one would expect, the sensitivity of the patient increased with the duration and amount of irradiation treatment. When radium alone was used, the disturbances occurred in only about a third of the cases and they were light in character, but when both radium therapy and roentgen therapy were used the severity of the attacks seemed to vary almost exclusively with the roentgen dosage applied.

The general resemblance of the manifestations of irradiation sickness to a neurovegetative disturbance suggested treatment with the sympathomimetic amine, psychergine (a benzedrine derivative). Following the use of this drug 37 patients presented complete regression of the most common manifestations (disturbances of the digestive tract, sensations of weakness, and depressive mental states). The insomnias and headaches were not manifestly decreased, but were even increased; however, the former could be controlled by sedatives, such as the barbiturates, valerian, and bromides, and the latter by reduction of the amount of the drug given. This presented no problem as the condition improved rapidly enough, as a rule, to permit prompt reduction of the dosages in 2 or 3 days.

JOHN W. BRENNAN, M.D.

MISCELLANEOUS

CLINICAL ENTITIES—GENERAL PHYSIOLOGICAL CONDITIONS

Muller, W. H., Jr., and Harkins, H. N.: Malignant Soft Tissue Tumors of the Lower Extremities; A Radical-Conservative Technique of Wide Excision and Skin Grafting without Amputation. *Surgery*, 1947, 21: 245.

A method of treating certain malignant tumors of the lower extremities by wide excision, followed by skin grafting, is presented. The technique is not advocated as a substitute for amputation nor is it felt that the percentage of cures will be as high with this technique as with amputation. It may, however, be applicable in those cases in which amputation is refused. While the method may be used in the treatment of any type of malignancy, it is believed that it can best be used for the more slowly growing fibrosarcomas, liposarcomas, and myxosarcomas. This group comprises a relatively small proportion of malignant neoplasms; however, they are amenable to less radical surgery because they are slow growing, infiltrate locally, and are slow to metastasize.

An incision is made about the tumor in such a manner as to include a very wide margin of skin. The incision should extend down through the subcutaneous tissue, and an even larger area of fascia should be removed. If the tumor involves the muscles, these should be excised to an equally radical degree. Frozen sections from the periphery of the excision may be of value in determining the adequacy of removal. If it is found that such structures as the sciatic nerve or great vessels are involved in the tumor, amputation is indicated. Immediately after excision the wound is covered with split skin grafts. Postoperative x-ray therapy to most of these tumors is considered of little value. Five cases have been treated by this method, the elapsed time since operation being from 5 to 24 months. FRANK F. KANTHAK, M.D.

Imler, A. E., and Underwood, J. W.: Malignant Melanoma of the Negro. *South Surgeon*, 1947, 13: 61.

The present report on 6 cases of malignant melanoma brings the total number of cases reported in the literature, to 49. However, the authors believe that this condition is not reported as frequently as it is seen, and they estimate its frequency, as compared with the white race, to be 1 to 3 or 4.

They present the second reported case of malignant melanoma in the negro arising in the nose, the third reported case occurring in the mouth, and the first instance of a primary lesion of the rectum.

The relative scarcity of malignant melanoma in the negro is possibly best explained on the basis of a better physiological control of pigment formation.

As malignant melanomas are found in equal frequency on the soles of the feet in the white and negro races, there is no basis to support the common belief that malignant melanomas in the negro are more likely to arise in areas of partial pigmentation.

The origin of malignant melanoma is still unsettled.

Malignant melanoma in the negro is similar, in histologic appearance, to the lesions seen in white individuals, and there is no apparent difference in the relative malignancy. The microscopic pictures of the primary and metastatic lesions are frequently dissimilar.

The amount of pigmentation present is no indication of the degree of malignancy, although it is believed that considerable amounts of melanin mean a high degree of differentiation. This is of little importance since varying amounts of pigment may exist in the same tumor.

The role of trauma as an activating agent has been stressed by many authors. Malignant melanoma is one type of malignancy which, in many cases, has an indisputable relationship with trauma.

The authors review the literature on malignant melanomas in the negro and present 6 previously unreported cases. EDMUND R. DONOGHUE, M.D.

DUCTLESS GLANDS

Keating, F. R., Jr.: Hyperparathyroidism. *Am. J. Orthodont.*, 1947, 33: 116.

Hyperparathyroidism is called primary when more parathyroid hormone is produced than the body requires, and is called secondary when an increased production of parathyroid hormone is a compensatory response to some other condition. Primary hyperparathyroidism may be caused by a hyperfunctioning tumor of one or more of the parathyroids, or by hypertrophy and hyperplasia consisting entirely of "wasserhelle" cells and involving all the parathyroid glands.

At first recognized only when it had produced a severe and disabling disease of the skeleton, namely, osteitis fibrosa cystica generalisata, primary hyperparathyroidism is now known to occur without these extreme changes, and to vary remarkably both in the kind and intensity of its manifestations. Cases may be classified according to the presence or absence of skeletal involvement. In about a third of the cases there is classical osteitis fibrosa cystica generalisata; in a third there is minimal or atypical skeletal disease; and in the remainder there is no discernible evidence of skeletal involvement. In 75 to 95 per cent of cases there is calcification of the kidneys or renal stones.

Cardinal criteria. Regardless of its manifestations, primary hyperparathyroidism is always characterized by an increase of calcium and a reduction of phosphorus in blood serum, and by increased urinary excretion of both calcium and phosphorus.

Symptomatology. Symptoms vary greatly from patient to patient, both in number and in severity. They may be enumerated as follows:

(1) Symptoms directly related to the chemical changes in the blood and urine per se:
   (a) Urinary symptoms: polyuria and polydipsia
   (b) Gastrointestinal symptoms: anorexia, nausea, vomiting, abdominal pain
   (c) Neuromuscular symptoms: fatigue, lassitude or stupor, weakness, loss of muscle tone, muscular atony, constipation

(2) Symptoms resulting from involvement of the skeleton:
   (a) With minimal bone disease: vague aches and pains, backache
   (b) With osteitis fibrosa cystica: bone tenderness, pathologic fractures, decreased stature, pigeon breast and other deformities, cysts and tumors, particularly in the jaw, metacarpal bones, and ends of long bones

(3) Symptoms resulting from secondary involvement of the urinary tract:
   (a) With nephrocalcinosis (calcification of the renal substance), renal insufficiency and uremia
   (b) With renal calculi: renal pain, renal colic, urinary obstruction and infection, pyelonephritis and uremia

Roentgenographic findings. Abnormalities evident in roentgenograms vary from mild reduction of bone density in cases of minimal bone disease to a striking picture in osteitis fibrosa cystica generalisata. The latter is characterized by miliary osteoporosis, fibrocystic change in skeletal architecture, subcortical cysts, fractures, tumors, large cystic lesions, and deformities. The entire skeleton is affected, the skull and long bones usually more so than the spinal column.

Dental findings. In cases of intensive bone disease, the abnormal metaplasia of bone occasionally produces malocclusion and prognathism. Epulis is fairly common. Teeth sometimes fall out because of resorption of the underlying bone, but the teeth themselves are unaffected by the demineralizing process, and dental caries is, if anything, reduced. Dental roentgenograms show loss of bone architecture and a characteristic ground glass osteoporosis with disappearance of the lamina dura.

Physiologic implications of primary hyperparathyroidism without bone disease. Regardless of the site of action of parathyroid hormone, it is axiomatic that excretion of calcium in urine and feces must exceed ingestion of calcium before calcium stores in the skeleton can become depleted. Other factors being equal, patients who have less severe degrees of hypercalciuria (that is, milder hyperparathyroidism) or more adequate calcium intake in the diet (that is, milk drinkers) are therefore most likely to escape bone involvement, but other factors, thus far unknown, also may be involved. The very existence of hyperparathyroidism without bone disease favors the "renal theory" over the "bone theory" of action of parathyroid hormone, although proponents of the latter point that absence of clinical or roentgenographic evidence of involvement of bone does not entirely exclude it.

Differential diagnosis. Hyperparathyroidism must be differentiated from (1) other conditions elevating the serum calcium, such as hypervitaminosis D, acute osteoporosis, multiple myeloma, sarcoidosis and metastatic malignant lesions; (2) other conditions affecting the skeleton, i.e., senile, postmenopausal and secondary osteoporosis, secondary hyperparathyroidism, rickets, osteomalacia, Paget's disease, osteogenesis imperfecta, and osteitis fibrosa cystica disseminata.

Practically speaking, the recognition of hyperparathyroidism depends on considering the possibility in (1) all patients who have cystic or demineralizing disease of bone, (2) all patients who have renal calculi or who have renal insufficiency of undetermined origin, (3) patients who have polyuria and polydipsia, and (4) patients who have severe and unexplained gastrointestinal symptoms.

Secondary hyperparathyroidism. Severe chronic renal insufficiency is accompanied by parathyroid hyperplasia involving chief cells, and sometimes by renal rickets or renal osteitis. The exact pathogenesis of these bone lesions is in doubt. A similar hyperplasia of the chief cells of the parathyroids also occurs in rickets due to vitamin D deficiency, osteomalacia, pregnancy, lactation, and other conditions accompanied by calcium deprivation.

Treatment of hyperparathyroidism. Medical treatment is dangerous, irradiation therapy ineffective. Surgical removal of a parathyroid tumor or subtotal resection of parathyroid hyperplasia is the only effective treatment for primary hyperparathyroidism. Secondary hyperparathyroidism per se is probably a compensatory phenomenon and should not be suppressed.

Gherlinzoni, G.: Parathyroidectomy and Recklinghausen's Disease (Paratiroidectomia e morbo de Recklinghausen). *Chir. org. movim.*, 1946, 30: 325.

Two clinical cases of fibrocystic osteitis, with bone swellings, deformities, and a history of repeated fractures incident to slight trauma, were operated upon and a search was made for parathyroid hypertrophy or adenoma. In one case, that of a 28 year old white male, the extremities were of excessive length, and in both cases the roentgenologic examination disclosed, in addition to the cystic areas, faulty calcification of the long bones. The laboratory reported the presence of excessive calcium in the blood and the excretion of excessively large amounts in the urine for both cases. In the second case, that of a boy of 12 years, there were no signs of the onset of puberty. At operation no adenoma was found in either case; however, normal parathyroid glands or tissues which appeared to represent normal parathyroid glands were removed from the left side, of

the man after exposure of the left border of the thyroid gland. From the boy both right and left inferior parathyroids were removed.

Following the operation in the man, the histologic examination showed that the tissues removed were not parathyroid, although there was a noticeable fall in the blood calcium and phosphorus. Roentgenologic examination showed that the distribution of calcium in the bones remained about the same, and 2 years later the patient suffered a fracture of the lower third of the left tibia. Five years later the calcemia was still below that preceding the operation, the patient was generally well and able to work, and x-rays showed improved bone calcification, especially in the region of the cystic involvement of the left tibia. In the boy the calcemia decreased and remained decreased for a period of nearly 2 years of observation.

A number of osteotomies were done for correction of the deformities present, and the histologic examination of the wedges of bone tissue removed at these times (all at least a month following the operation) showed evidence of much formation of osteoid tissue and intense activity of the osteoblasts.

From these experiences and a study of the literature, the author concludes that there is a possibility that Recklinghausen's disease may occur in the absence of parathyroid adenoma or hypertrophy, that spontaneous remissions may occur but that the simple exploratory operation without removal of even normal parathyroid tissue is inefficacious, and that at least some normal parathyroid should be removed in this contingency. Corrective osteotomies may be undertaken shortly after these parathyroidectomies and consolidation of the resultant dehiscences will take place in normal periods of time. The author does not wish to cast any doubt on the relationship of Recklinghausen's disease to parathyroid adenoma, nor to deprecate the necessity of surgical exploration of the thyroid region in these patients.

JOHN W. BRENNAN, M.D.

SURGICAL PATHOLOGY AND DIAGNOSIS

Deming, C. L., Hovenanian, M. S., and Greene, H. S. N.: Heterologous Transplantation of Carcinoma of the Urethra. *J. Urol.*, Balt., 1947, 57: 319.

The selective ability of cancer to survive and to grow upon heterologous transfer offers a ready means of differentiation from other growths possessing a morphological or clinical resemblance.

The authors describe the results obtained in 2 cases of heterologous transplantation of carcinoma of the human male urethra. Both male and female guinea pigs were used as alien hosts, and heterologous transfer was successfully carried out.

In the first case the cancer originated in the posterior portion of the anterior urethra, and the section used for transfer was derived from its metastatic inguinal lymph node. Ten animals were inoculated, 6 male and 4 female, and a single "take" resulted. This animal, a male, was sacrificed on the eighty-first day following inoculation, at which time the anterior chamber of the eye was two-thirds filled by tumor.

In the second case, the cancer originated in the anterior portion of the anterior urethra, and a section of the cancer from that area was transplanted. Four animals, all male guinea pigs, were selected as alien hosts, and again a single "take" resulted. The animal with the successful "take" was sacrificed after 43 days, at which time the anterior chamber was one-half filled by tumor.

Morphologically the transplants resembled the original tumor in every respect. In the case of the adenoacanthoma, both epidermoid and adenoid architecture were present in the transplant; in the second case, the epidermoid structure of the transplant reflected that found in the original tumor.

Cancers of the urethra, like other malignant growths in man, are transplantable heterologously. The subsequent history of the 2 cases in question bears out the previous suggestion that only those tumors capable of heterologous transfer are true cancers. The growth of transplant in alien hosts reflects the morphological character of the growth in the original human host. HARRY W. FINK, M.D.

Snyder, H. E., and Culbertson, J. W.: Causes of Death in Battle Casualties Reaching Hospitals. *Am. J. Surg.*, 1947, 73: 184.

The authors present a statistical report on 1,450 American battle casualties occurring in the Fifth Army Hospitals, in Italy, from January 1, 1944 to May 2, 1945. The number of men dying on the battle field or on the way to a hospital was found to be

TABLE I.— DISTRIBUTION OF DEATHS STUDIED BY PRINCIPAL WOUND GROUPS

	Number of cases	Percentage of deaths studied
Intra-abdominal	408	28.1
Intracranial	297	20.5
Thoraco-abdominal	212	14.6
Intrathoracic	138	9.5
Lower extremity, with bone involvement	114	7.8
Unclassified, multiple wounds	114	7.8
Combined intra-abdominal & intrathoracic	59	4.1
Lower extremity, soft tissue only	31	2.2
Intraspinal (i.e., intravertebral)	27	1.9
Cervical	25	1.7
Upper extremity, with bone involvement	10	0.7
Maxillofacial, with bone involvement	3	0.6
Upper extremity, soft tissue only	4	0.3
Abdominal wall	3	0.2
Total	1450	100.0

TABLE II.—DATA RELATIVE TO HOSPITAL ADMISSION, ANESTHESIA, SURGERY AND ETIOLOGY IN THE 523 CASES* IN WHICH THE IMMEDIATE CAUSE OF DEATH WAS SHOCK

	Dead on Arrival	Dying on admission	Died before anesthesia †	Died during anesthesia induction	Died during primary surgery	Died Subsequent to primary surgery	Total
Etiology of shock: Trauma and hemorrhage	15	35	71	0	10	53	184
Contamination or sepsis plus trauma and hemorrhage	1	2	10	3	11	93	120
Cardiorespiratory embarrassment plus trauma and hemorrhage plus contamination or sepsis	1	1	10	0	12	48	72
Cardiorespiratory embarrassment plus trauma and hemorrhage	8	17	44	3	15	60	147
Total	25	55	135	6	48	254	523

*36.1% of 1450 American battle casualty deaths reported by Fifth Army Hospitals January 1, 1944 to May 2, 1945.
†Excludes dead on arrival and dying on admission.

about ten times as great as that of men who died after reaching the hospital. The cases were studied from the standpoint of principal wound groups (Table I) and the immediate cause of death. Among the cases reviewed, 733 gross autopsy reports were available for study.

Shock was named as the immediate cause of death in 523 of the 1,450 cases. In addition to these cases there were 750 other cases in which shock was a contributory or associated condition. In only 177 of the 1,450 deaths was there no evidence of shock. Loss of whole blood was the most important factor in the vast majority of battle casualties in shock (Table II). Neural trauma and/or intracranial hemorrhage or clot was second on the list, and the immediate cause of death in 213 cases. Third on the list of causes of death was nephropathy. This category includes all those cases in which death was known to be due to a lower nephron nephrosis or pigment nephropathy. Included in this group are a few cases in which mismatched blood transfusions produced the lesion; also included are a few cases in which sulfonamides were rather definitely the etiological agent. In the vast majority of cases, however, neither of these factors could be definitely named as the cause of the nephropathy. It is believed that some other factor, or factors, dependent upon a severe degree of shock over a long period of time was responsible for most of the cases. Peritonitis was fourth on the list of causes of death. Clostridial myositis was fifth on the list. A reduction in mortality in cases of this disease was noted primarily because of more complete surgery on all wounds, the more liberal use of blood, and the advent of extensive use of penicillin. Pneumonia, fat embolism, thrombotic embolism, and other factors were listed as causes of death. Twenty-seven patients died of fat embolism. This diagnosis was not recorded except when microscopic reports indicated large amounts of fat in the pulmonary sections, and the record indicated a clinical behavior justifying the diagnosis.

JOHN E. KARABIN, M.D.